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Note.—Those whose names are printed in italics devote only a small portion of their time to work of the Nauti Almanac Office.

July, 1916.

PREFACE.

This volume of the *American Ephemeris and Nautical Almanac* was prepared under the immediate supervision of Professor W. S. Eichelberger, U. S. N., the Director. The character of the matter herein contained and its arrangement are the same as in the immediately preceding volumes.

This is the fourth volume to be issued under the international agreement resulting from the *Congrès International des Éphémérides Astronomiques* held at Paris in October, 1911.

The naval appropriation bill approved August 22, 1912, contained the following:

> The Secretary of the Navy is hereby authorized to arrange for the exchange of data with such foreign almanac offices as he may from time to time deem desirable, with a view to reducing the amount of duplication of work in preparing the different national nautical and astronomical almanacs and increasing the total data which may be of use to navigators and astronomers available for publication in the American Ephemeris and Nautical Almanac: *Provided*, That any such arrangement shall be terminable on one year's notice: *Provided further*, That the work of the Nautical Almanac Office during the continuance of any such arrangement shall be conducted so that in case of emergency the entire portion of the work intended for the use of navigators may be computed by the force employed by that office, and without any foreign cooperation whatsoever: *Provided further*, That any employee of the Nautical Almanac Office who may be authorized in any annual appropriation bill and whose services in whole or in part can be spared from the duty of preparing for publication the annual volumes of the American Ephemeris and Nautical Almanac may be employed by said office in the duty of improving the tables of the planets, moon, and stars, to be used in preparing for publication the annual volumes of the office: *Provided further*, That section four hundred and thirty-five, Revised Statutes, is hereby repealed.

The Greenwich ephemerides of the Sun, Venus, Mars, Jupiter, Saturn, Uranus, and Neptune, and the right ascension and declination of the Moon for each hour were furnished by the office of the British *Nautical Almanac*.

The Greenwich ephemeris of Mercury and the apparent places for Greenwich transit of 518 ten-day stars were furnished by the office of the *Berliner Jahrbuch*.

The conjunctions, phenomena, and configurations of Jupiter's satellites I–IV and the apparent places for Greenwich transit of 38 circumpolar stars were furnished by the office of the *Connaissance des Temps*.

The longitude, latitude, and horizontal parallax of the Moon, and the apparent places for Greenwich transit of 121 ten-day stars were furnished by the office of the *Almanaque Nautico*.

The apparent places for Greenwich transit of 137 ten-day stars were furnished by the office of the *Annuario Astronomico di Torino*.

In accordance with the recommendations of the *Congrès International des Éphémérides Astronomiques*, most of the material furnished from abroad is based upon tables prepared in the American Nautical Almanac Office. In the Introduction are mentioned the various tables upon which the different ephemerides are based.

The following computations were made by the American Nautical Almanac Office:

In Part I, all the hourly and daily variations for the quantities furnished from abroad except in the case of the right ascension and declination of the Moon.

In Part II, the quantities used in computing the apparent places of the stars from their mean places; the mean place list; the interpolation of the apparent places of 814 stars from transit at Greenwich to transit at Washington; the apparent places of 11 stars; the interpolation of the ephemerides of the Sun, Moon, and planets from Greenwich noon to transit at Washington; the stellar magnitudes of the planets.

In Part III, the data relating to the eclipses of the Sun and Moon; the data relating to the occulations of stars and planets by the Moon; the ephemerides for physical observations of the Sun, Moon, Mars, and Jupiter; the elements of the illuminated disks of Mercury and Venus; the stellar magnitudes of the planets; the data concerning the satellites of Saturn, Uranus, Neptune, and the fifth, sixth, and seventh satellites of Jupiter; the diagrams of all the satellite orbits; the list of phenomena; the list of observatories with their geographical coordinates; the tables for the determination of latitude and azimuth from observations of Polaris; and the tables for the determination of the time of the rising and setting of the Sun and Moon.

All computations made in the American Nautical Almanac Office and those received from the other offices were subjected to checks to insure absence of errors.

J. A. HOOGEWERFF,
Captain, U. S. Navy,
Superintendent Naval Observatory.

U. S. Naval Observatory, July, 1916.

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The American Ephemeris, 1917.

231	Footnote, 32 H Camelop.	*for*	5^m, 19''.8 s. pr.	*read*	5^m.8, 21''.6 n. pr.

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149	Dec. 32, Helioc. Latitude	*for*	37.0	*read*	36.7
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INTRODUCTION.

The ephemeris of the Sun is constructed from NEWCOMB's *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1.

The adopted value of the mean equatorial horizontal parallax of the Sun is 8″.80, *Paris Conference, May, 1896.*

The Sun's rectangular equatorial coordinates are computed from the longitudes and latitudes by the following formulæ:

$$X = R\cos\lambda$$
$$Y = R\sin\lambda\cos\omega - 19.3\,R\,\beta$$
$$Z = R\sin\lambda\sin\omega + 44.5\,R\,\beta$$

The reductions to mean equinox are computed by the formulæ—

$$\Delta X = +Y\sec\omega\,\Delta\lambda\sin 1''$$
$$\Delta Y = -X\cos\omega\,\Delta\lambda\sin 1'' + Z\Delta\omega\sin 1'' + 9.1\,\tau R\sin(\lambda+6^\circ)$$
$$\Delta Z = -X\sin\omega\,\Delta\lambda\sin 1'' - Y\Delta\omega\sin 1'' - 21.0\,\tau R\sin(\lambda+6^\circ)$$

where the numerical coefficients are in units of the seventh place of decimals and

R = the Sun's distance from the Earth.
λ = the Sun's true longitude,
β = the Sun's true latitude, expressed in seconds of arc,
ω = the obliquity of the ecliptic,
$\Delta\lambda$ = the reduction of longitude for precession and nutation from the beginning of the Besselian fictitious year,
$\Delta\omega$ = the reduction of the mean to the apparent obliquity,
τ = the fraction of the year since the beginning of the Besselian fictitious year.

The longitude, latitude, and parallax of the Moon are derived from HANSEN's *Tables de la Lune* (London, 1857), the mean longitude being corrected as in previous years, beginning with the volume for the year 1883. The statement concerning these corrections which is contained in the volumes from 1883 to 1911, inclusive, is erroneous, in that they have not been computed strictly in accordance with the formula in NEWCOMB's *Researches on the Motion of the Moon*, part 1, page 268, *Washington Observations*, 1875, Appendix II. That formula is,

$$-1''.14 - 29''.17\,T - 3''.86\,T^2 - V_2 - 0''.09\sin A - 15''.49\cos A,$$

while the expression actually used is,

$$-1''.14 - 29''.17\,T - 3''.76\,T^2 - V_2 - 15''.49\cos A.$$

In these formulæ T is the time in units of 100 years reckoned from 1800.

The ephemerides of Mercury, Venus, and Mars are derived from NEWCOMB's tables of these planets, *Astronomical Papers of the American Ephemeris*. Vol. VI, parts 2, 3, and 4.

The ephemerides of Jupiter and Saturn are derived from the tables constructed in this office by GEORGE W. HILL, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 1 and 2.

The ephemerides of Uranus and Neptune are derived from NEWCOMB'S tables of these planets, *Astronomical Papers of the American Ephemeris*, Vol. VII, parts 3 and 4.

The nutation used in computing the ephemerides of the Sun, Moon, and planets has been taken from Tables XXXII and XXXIII of NEWCOMB'S *Tables of the Sun, Astronomical Papers of the American Ephemeris*, Vol. VI, part 1. The formulæ from which this nutation is computed are as follows, the time interval T being expressed in units of 100 years, reckoned from 1900. See *Tables of the Sun*, page 26.

$$
\begin{aligned}
\delta\psi = &-(17''.234+0''.017\,T)\sin ☊ \\
&+\ 0''.209 \sin 2☊ \\
&-\ 1''.257 \sin 2L \\
&-\ 0''.049 \sin (3L+78^{\circ}.7) \\
&+\ 0''.110 \sin (L+75^{\circ}.3)
\end{aligned}
\qquad
\begin{aligned}
\delta\epsilon = &+9''.214 \cos ☊ \\
&-0''.090 \cos 2☊ \\
&+0''.546 \cos 2L \\
&+0''.021 \cos (3L+78^{\circ}.7) \\
&-0''.009 \cos (L-78^{\circ}.7)
\end{aligned}
$$

The formulæ for the nutation used in computing the Besselian and Independent Star Numbers are as follows:

Terms of Long Period.	Terms of Short Period.
$\delta\psi = -(17.''234+0''.017\,T)\sin ☊$	$-0''.204 \sin 2☾$
$+\ 0''.209 \sin 2☊$	$+0''.011 \sin (☾+\Gamma')$
$-\ 1''.272 \sin 2L$	$+0''.068 \sin (☾-\Gamma')$
$+\ 0''.126 \sin (L-\Gamma)$	$-0''.034 \sin (2☾-☊)$
$-\ 0''.050 \sin (3L-\Gamma)$	$-0''.026 \sin (3☾-\Gamma')$
$+\ 0''.021 \sin (L+\Gamma)$	$+0''.015 \sin (☾-2L+\Gamma')$
$+\ 0''.012 \sin (2L-☊)$	$+0''.006 \sin 2(☾-L)$
$\delta\epsilon = +(9''.210+0''.0009\,T)\cos ☊$	$+0''.088 \cos 2☾$
$-\ 0''.090 \cos 2☊$	$+0''.018 \cos (2☾-☊)$
$+\ 0''.551 \cos 2L$	$+0''.011 \cos (3☾-\Gamma')$
$+\ 0''.022 \cos (3L-\Gamma)$	$-0''.005 \cos (☾+\Gamma')$
$-\ 0''.009 \cos (L+\Gamma)$	
$-\ 0''.007 \cos (2L-☊)$	

The meaning of the symbols used and the manner in which these latter formulæ have been employed in computing the ephemerides of the stars are explained on pages 200 and 201. The slight discrepancy between the terms in 2 L in these two sets of formulæ is due to the correction of an error in the first set. See *Bulletin Astronomique*, 1898, Vol. XV, page 244.

The list of 825 stars contained in Part II has been selected from NEWCOMB'S *Catalogue of Fundamental Stars, Astronomical Papers of the American Ephemeris*, Vol. VIII, part 2.

In general, the names of the stars are the same as in NEWCOMB'S Suggested List of Fundamental Stars, except that the FLAMSTEED number has been omitted in all cases where Greek or italic letters are available. In some cases the constellation and number of the uranometries of HEIS or GOULD have been used. In all such cases, H^1 or the letter G precedes the constellation name, as, for example, 5 H^1. Cassiopeiæ and 38 G. Horologii.

The magnitudes of the stars have, with a few exceptions, been taken from *Annals of the Harvard College Observatory*, Vol. L, 1908.

The spectral classification has been furnished by the Harvard College Observatory. The notation is that of *Annals of Harvard College Observatory*, Vol. LVI.

The mean places, annual variations, and annual proper motions of the stars have been taken from NEWCOMB's Catalogue, except that those of ϵ Hydri, 38 G. Horologii, and π Centauri have been taken from *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33.

The values of $\Delta\alpha$ and $\Delta\delta$ which are given for the companions to the stars γ Andromedæ, α^1 Crucis, ζ^1 Ursæ Majoris and 61 Cygni, have been taken from Boss's *Preliminary General Catalogue*, and those for α^2 Geminorum from DOBERCK's elements given in the *Astronomische Nachrichten*, 1904, vol. 166, page 145.

The formulæ for the computation of the Besselian and Independent Star Numbers are given on page 200, the coefficients being those given by NEWCOMB in *Bulletin Astronomique*, 1898, Vol. XV, page 241.

The terms of short period of the nutation, depending on the Moon's mean longitude, have been computed from the formulæ for these terms given above.

The method by which the right ascensions and declinations of the stars interpolated from the 10-day ephemerides are corrected for the effect of these short-period terms is given on page 201.

According to the formulæ on pages 200 and 201 the star constants $a, b, c, d, a', b', c', d'$ are computed for each star from its mean place at the beginning of the year, but if strict accuracy is required they should be computed from the star's mean place at date, and the following second-order terms should be added to the usual expressions for the reduction from mean to apparent place, namely—

To $\alpha-\alpha_0$

$$\begin{array}{l}
\text{s} \\
\left.\begin{array}{l} +0.000\,003\ \tau^2 \sin\alpha \\ -0.000\,149\ \tau^2 \cos\alpha \end{array}\right\}\tan\delta \\
\left.\begin{array}{l} -0.000\,0650\ \tau^2 \sin 2\alpha \\ +0.000\,0103 \sin 2\Omega \cos 2\alpha \\ -0.000\,0107 \cos 2\Omega \sin 2\alpha \end{array}\right\}\tan^2\delta \\
\left.\begin{array}{l} +0.000\,0620 \sin 2\odot \cos 2\alpha \\ -0.000\,0622 \cos 2\odot \sin 2\alpha \end{array}\right\}\sec^2\delta \\
\left.\begin{array}{l} +0.000\,0513 \sin(\odot+\Omega) \cos 2\alpha \\ -0.000\,0507 \cos(\odot+\Omega) \sin 2\alpha \\ +0.000\,0097 \sin(\odot-\Omega) \cos 2\alpha \\ -0.000\,0053 \cos(\odot-\Omega) \sin 2\alpha \end{array}\right\}\tan\delta\sec\delta
\end{array}$$

To $\delta-\delta_0$

$$\begin{array}{l}
'' \\
\left.\begin{array}{l} +0.000\,975\ \tau^2 \sin^2\alpha \\ -0.000\,023 \cos 2\Omega \\ -0.000\,080 \cos 2\Omega \cos 2\alpha \\ -0.000\,077 \sin 2\Omega \sin 2\alpha \\ +0.000\,040 \cos 2\odot \\ -0.000\,467 \cos 2\odot \cos 2\alpha \\ -0.000\,465 \sin 2\odot \sin 2\alpha \end{array}\right\}\tan\delta \\
\left.\begin{array}{l} -0.000\,039 \cos(\odot+\Omega) \\ -0.000\,380 \cos(\odot+\Omega) \cos 2\alpha \\ -0.000\,385 \sin(\odot+\Omega) \sin 2\alpha \\ -0.000\,380 \cos(\odot-\Omega) \\ -0.000\,040 \cos(\odot-\Omega) \cos 2\alpha \\ -0.000\,072 \sin(\odot-\Omega) \sin 2\alpha \end{array}\right\}\sin\delta\tan\delta
\end{array}$$

These terms are negligible for stars whose declination is numerically less than 80°, but in computing the apparent places given in the American Ephemeris they have been applied whenever sensible.

The *apparent* places of seven stars have been corrected for the effect of annual parallax. These stars, with the adopted values of the annual parallax, are—

	″		″
τ Ceti	0.31	α Centauri	0.75
ϵ Eridani	0.32	α Aquilæ (Altair)	0.23
α Canis Majoris (Sirius). .	*0.38*	61 Cygni	0.30
α Canis Minoris (Procyon).	*0.33*		

The *apparent* places of α Canis Majoris (Sirius), α Canis Minoris (Procyon), and α^2 Centauri have been corrected for the effect of orbital motion. AUWERS's elements were used for Sirius and Procyon, and SEE's elements for α^2 Centauri. The values of these corrections are given on pages 98 and 99 of *Veroeffentlichungen des Koeniglichen Astronomischen Rechen-Instituts zu Berlin*, 1907, No. 33, but those for Sirius and Procyon need an additional correction to refer them to the center of the orbit before they are applicable to the mean places taken from NEWCOMB's Fundamental Catalogue. These additional corrections for Sirius and Procyon were omitted in the *Star List of the American Ephemeris* [*Supplement to the American Ephemeris and Nautical Almanac*] for 1910 and 1911, and in the *American Ephemeris and Nautical Almanac* for 1912 and 1913. The values of the corrections for the three stars are—

	Sirius.		Procyon.		α^2 Centauri.	
	1919.0	1920.0	1919.0	1920.0	1919.0	1920.0
$\Delta\alpha$	$-0^s.143$	$-0^s.141$	$-0^s.057$	$-0^s.051$	$+0^s.620$	$+0^s.605$
$\Delta\delta$	$-0''.84$	$-0''.96$	$+0''.31$	$+0''.43$	$+5''.41$	$+5''.10$

These corrections have not been applied to the mean places as published in this volume.

The stars occulted by the Moon have been selected from the *Catalogue of Zodiacal Stars* contained in Vol. VIII, part 3, *Astronomical Papers of the American Ephemeris*, and the mean places have been derived from the same catalogue.

In Part III the elements of eclipses of the Sun and occultations of stars by the Moon are given in accordance with BESSEL's method, the special forms employed being a modification of those developed in CHAUVENET's *Spherical and Practical Astronomy*.

In the computation of the elements of eclipses, the following corrections to the longitude, latitude, and parallax of the Moon, deduced by NEWCOMB from recent observations of occultations of stars by the Moon, *Astronomical Papers of the American Ephemeris*, Vol. IX, part 1, have been applied. These corrections have been assumed in each case to be constant during the eclipse.

G. M. T. 1919		δv ″	δb ″	$\delta\pi$ ″
May 29^d	1^h	+6.8	+1.3	+0.49
Nov. 7	12	+6.0	+1.6	+0.50
Nov. 22	3	+5.4	−0.1	+0.40

The elongations of the satellites of Mars are derived from elements given by H. STRUVE in *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1911, page 1073.

The conjunctions and phenomena of Jupiter's four brighter satellites are derived from SAMPSON's tables. The configurations are derived from a continuation of DAMOISEAU's tables by M. POTTIER.

The elongations of the Vth satellite of Jupiter are derived from unpublished elements deduced from the observations of BARNARD.

The differential coordinates of Jupiter's VIth and VIIth satellites are derived from elements and tables given in *Lick Observatory Bulletin*, 1906, Vol. IV, No. 112, and in *Astronomische Nachrichten*, 1907, Vol. 174, page 359, respectively.

The positions of the rings and the elongations and conjunctions of the satellites of Saturn are derived from elements given by H. STRUVE in *Observations de Poulkova*, Supplement 1, St. Petersburg, 1888; *Publications de Poulkovo*, Second Series, Vol. XI, St. Petersburg, 1898; with corrections communicated by H. STRUVE to the *Berliner Jahrbuch*. The differential coordinates of Phœbe are derived from elements and tables given in *Annals of Harvard College Observatory*, 1905, Vol. LIII, No. VI.

The apparent outer dimensions (a and b) of the rings of Saturn are also according to STRUVE; the relative dimensions of the rings are computed from BESSEL's data, except those for the dusky ring, which are based on the observations of various astronomers.

The elongations of Ariel and Umbriel, the inner satellites of Uranus, are derived from the data of NEWCOMB's *Uranian and Neptunian Systems, Washington Observations*, 1873, Appendix I. The elongations of Titania and Oberon, the outer satellites of Uranus, are derived from elements given by H. STRUVE in *Abhandlungen der K. Preussischen Akademie der Wissenschaften*, 1912.

The elongations of the satellite of Neptune are derived from elements given by A. HALL in the *Astronomical Journal*, 1898, Vol. XIX, page 65.

The adopted apparent semidiameter of the Sun at the Earth's mean distances is 16′ 1″.50, while in the computation of eclipses the value given by AUWERS in the *Astronomische Nachrichten*, 1891, Vol. 128, page 367, is employed, viz., 15′ 59″.63.

In the computation of the ephemeris for physical observations of the Sun the following elements by CARRINGTON have been used:

Inclination of the Sun's equator to the ecliptic	7° 15′
Longitude of the ascending node of the Sun's equator on the ecliptic	73° 40′+50″.25 (t−1850)
Sidereal period of rotation (mean solar days)	25^d.38

The apparent semidiameter of the Moon is computed from the Moon's equatorial horizontal parallax, π, by the formula,

$$S=0.272\ 506\ \pi+1''.50$$

where the constant 0.272 506 is based on data from occultations given by J. PETERS in the *Astronomische Nachrichten*, 1895, Vol. 138, page 147; and the constant 1″.50 is added to cover the average effect of irradiation.

The value of the Moon's semidiameter employed in the computation of eclipses is computed from the formula,

$$\sin S=0.272\ 274 \sin \pi$$

In the computation of the ephemeris for physical observations of the Moon, the following notation and formulæ have been used, the value of I and the formulæ for physical libration being those given by F. HAYN in *Abhandlungen der K. Sächsischen Gesell. der Wissenschaften*, Vols. 29 and 30, 1904, 1907:

I=the inclination of the Moon's mean equator to the ecliptic (=1° 32′.1),

☊=the longitude of the ascending node of the Moon's orbit, or the longitude of the descending node of the Moon's mean equator,

C=the angle at the center of the Moon's disk made by a lunar meridian with the circle of declination, counted from north to east,

$\lambda, \beta, \alpha, \delta$=the geocentric longitude, latitude, right ascension, and declination of the Moon,

i = the inclination of the Moon's mean equator to the Earth's true equator,
Δ = the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic,
Ω' = the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator,
☾ = the Moon's mean longitude, referred to the mean equinox,
g' = the Earth's mean anomaly,
g = the Moon's mean anomaly,
ω = the angular distance of the perigee of the Moon's orbit from its ascending node on the ecliptic,
b, l = the optical librations in latitude and longitude, respectively,
δb, δl = the physical librations in latitude and longitude, respectively,
$b+\delta b$ = the Moon's geocentric libration in latitude = the Earth's selenographic latitude,
$l+\delta l$ = the Moon's geocentric libration in longitude = the Earth's selenographic longitude,
δC = the physical libration of C,

$$\mu = -0'.617 \sin 2\,(\Omega-\lambda),$$

$$A = \sin I \cos(\Omega-\lambda),$$

$$\tan B = \tan I \sin(\Omega-\lambda),$$

$$\lambda' = \lambda+\mu+Ab,$$

$$b = B-\beta,$$

$$l = \lambda' - ☾,$$

$$\sin C' = \sin i\,\frac{\cos(\lambda'+\Delta-\Omega)}{\cos\delta} = -\sin i\,\frac{\cos(\alpha-\Omega')}{\cos b},$$

$$\delta b = +108'' \sin(\omega+l)+37'' \sin(\omega-l)-11'' \sin(g+\omega-l),$$

$$\delta l = +12'' \sin g - 59'' \sin g' - 18'' \sin 2\omega,$$
$$-[108'' \cos(\omega+l)-37'' \cos(\omega-l)+11'' \cos(g+\omega-l)] \tan b,$$

$$\delta C = -[108'' \cos(\omega+l)-37'' \cos(\omega-l)+11'' \cos(g+\omega-l)] \sec b,$$

$$C = C'+\delta C.$$

The Sun's selenographic latitude and longitude have been computed from formulæ the same as those given above except that the heliocentric coordinates of the Moon have been substituted for the geocentric coordinates.

The following elements have been used in computing the ephemerides for physical observations of the planets Mars and Jupiter:

Position of north pole of Mars	$\alpha = 21^h\ 10^m\ 0^s + 1^s.565(t-1905)$ $\delta = 54°\ 30'\ 0'' + 12''.60(t-1905)$
Position of north pole of Jupiter	$\alpha = 17^h\ 52^m\ 0^s.84 + 0^s.247(t-1910)$ $\delta = 64°\ 33'\ 34''.6 - 0''.60(t-1910)$
Rotation period of Mars	$24^h\ 37^m\ 22^s.65$
Rotation period of Jupiter, System I.	$9^h\ 50^m\ 30^s.004$
Rotation period of Jupiter, System II.	$9^h\ 55^m\ 40^s.632$
Longitude of Central Meridian of Mars, May 15, 1897, Greenwich Mean Noon	52°.01
Longitude of Central Meridian of Jupiter (System I.), July 14, 1897, Greenwich Mean Noon	47°.31
Longitude of Central Meridian of Jupiter (System II.), July 14, 1897, Greenwich Mean Noon	96°.58

The position of the north pole of Mars is as given by LOWELL and CROMMELIN (see *Monthly Notices R. A. S.*, 1905, Vol. 66, page 56), while that of the north pole of Jupiter has been deduced from the position given by DAMOISEAU for 1750 (see *Tables Écliptiques des Satellites de Jupiter*, page (1)). The rotation periods of Mars and of Jupiter and the longitudes of the central meridians are according to MARTH (see *Monthly Notices R. A. S.*, 1896, Vol. 56, pages 395–403 and 517–524). The longitude of the Great Red Spot and the time of

its transit across the Central Meridian given in the volumes for 1913 and 1914 have been replaced by those of System II. of MARTH. This change has been made in view of the following facts: The Paris Conference of October, 1911, assigned to the office of the American Ephemeris and Nautical Almanac the preparation of the ephemerides for the physical observations of the planets; a general desire exists that the use of System II. of MARTH should not be discontinued; and the position of the Great Red Spot during the opposition of 1912 was about 70° from the place predicted from the elements adopted in the *American Ephemeris and Nautical Almanac* for 1913.

The adopted semidiameters of the planets, with the authority for each, are given on page xvii. Their stellar magnitudes have been computed from formulæ given by G. MUELLER in *Publicationen des Astrophysikalischen Observatoriums zu Potsdam*, 1893, Vol. 8, page 366.

In the list of observatories the authority for the various positions is given in each case. The latitudes given are in most cases astronomical. In some instances they have been determined by geodetic triangulation from other points. The reductions from geographic to geocentric latitude, $\varphi' - \varphi$, and the distance from the center of the earth, ρ, are computed from the formulæ on page xvi, using the flattening $\frac{1}{297}$ obtained by JOHN F. HAYFORD in *Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy*, U. S. Coast and Geodetic Survey, 1910, and adopted by the *Paris Conference*, October, 1911.

ANNIVERSARIES AND FESTIVALS, 1919.

New Year's Day	Wednesday,	Jan.	1.
Epiphany	Monday,	Jan.	6.
Lincoln's Birthday	Wednesday,	Feb.	12.
Septuagesima Sunday	Sunday,	Feb.	16.
Washington's Birthday	Saturday,	Feb.	22.
Quinquagesima (Shrove Sunday)	Sunday,	Mar.	2.
Ash Wednesday	Wednesday,	Mar.	5.
Palm Sunday	Sunday,	Apr.	13.
First Day of Passover	Tuesday,	Apr.	15.
Good Friday	Friday,	Apr.	18.
Easter Sunday	Sunday,	Apr.	20.
Rogation Sunday	Sunday,	May	25.
Ascension Day (Holy Thursday)	Thursday,	May	29.
Memorial Day	Friday,	May	30.
Hebrew Pentecost (Shebuoth)	Wednesday,	June	4.
Pentecost (Whit Sunday)	Sunday,	June	8.
Trinity Sunday	Sunday,	June	15.
Corpus Christi	Thursday,	June	19.
Independence Day	Friday,	July	4.
Labor Day	Monday,	Sept.	1.
Hebrew New Year (Rosh Hashanah)	Thursday,	Sept.	25.
Day of Atonement (Yom Kippur)	Saturday,	Oct.	4.
First Day of Tabernacle (Sucoth)	Thursday,	Oct.	9.
Columbus Day	Sunday,	Oct.	12.
Election Day (in certain States)	Tuesday,	Nov.	4.
Thanksgiving Day	Thursday,	Nov.	27.
First Sunday in Advent	Sunday,	Nov.	30.
Christmas Day	Thursday,	Dec.	25.

CHRONOLOGICAL ERAS AND CYCLES.

CHRONOLOGICAL ERAS.

The year 1919 of the Christian era comprises the latter part of the 143d and the beginning of the 144th year of the independence of the United States of America, and corresponds to the year 6632 of the Julian period.

Of the peoples using the Christian era some employ the Gregorian calendar and some the Julian. January 1, 1919, Julian calendar, corresponds to January 14, 1919, Gregorian calendar.

The year 7428 of the Byzantine era begins on September 1, 1919, Julian calendar.

The year 5680 of the Jewish era begins at sunset on September 24, 1919, Gregorian calendar.

The year 2672 since the foundation of Rome, according to VARRO, begins on January 1, 1919, Julian calendar.

The year 2668 of the era of NABONASSAR begins on May 1, 1919, Julian calendar.

The year 2579 of the Japanese era, being the 8th year of the period Taisho, begins on January 1, 1919, Gregorian calendar.

The year 2231 of the Grecian era, or the era of the SELEUCIDÆ, begins in the present-day usage of the Syrians on September 1, 1919, or on October 1, 1919, Julian calendar, according to different sects; but in the ancient usage of Damascus and Arabia Petræa the year began with the vernal equinox.

The year 1636 of the era of DIOCLETIAN begins on August 30, 1919, Julian calendar.

The year 1338 of the Mohammedan era, or the era of the Hegira, begins at sunset on September 25, 1919, Gregorian calendar.

2 421 960 is the Julian day number of January 1, 1919, Gregorian calendar.

CHRONOLOGICAL CYCLES.

Dominical Letter	E	Solar Cycle	24
Epact	29	Roman Indiction	2
Lunar Cycle or Golden Number	1	Julian Period	6632

ASTRONOMICAL CONSTANTS.

Solar Parallax	8″.80	Paris Conference.
Constant of Nutation	9.21	Paris Conference.
Constant of Aberration	20.47	Paris Conference.
General Precession	$50''.2564+0''.000\ 222(t-1900)$	Newcomb.
Obliquity of the Ecliptic	$23°\ 27'\ 8''.26-0''.4684(t-1900)$	Newcomb.
Equatorial Horizontal Parallax of the Moon	$57'\ 2''.63$*	(Newcomb).

Mean distance Earth to Moon 384 411 kilometers=238 862 statute miles or 60.2678 radii.
Mean distance Earth to Sun 149 504 201 kilometers=92 897 416 statute miles.
Velocity of light 299 860 kilometers=186 324 statute miles per second (Newcomb and Michelson).
Light travels unit distance in $498^s.580$.
Gaussian Gravitation Constant, †k=0.017 202 099=3 548″.187 61.

Acceleration in one second due to gravity, $g=9^m.8060-0^m.0260\cos 2\varphi-\frac{2h}{R}g$.‡ } Helmert.

Length of seconds pendulum, $l=0^m.993\ 549-0^m.002\ 631\cos 2\varphi-\frac{2h}{R}l$. ‡ } Helmert.

Length of the year:

Tropical (ordinary)	$365^d.242\ 198\ 79-0^d.000\ 000\ 0614\ (t-1900)$	Newcomb.
Sidereal	$365.256\ 360\ 42+0.000\ 000\ 0011\ (t-1900)$	Newcomb.
Anomalistic	$365.259\ 641\ 34+0.000\ 000\ 0304\ (t-1900)$	Newcomb.
Eclipse	$346.620\ 000\ \ +0.000\ 000\ 36\ \ (t-1900)$	

Length of the month:

	d	d	h	m	s	
Synodical (ordinary)	29.530 588	=29	12	44	2.8	Hansen.
Tropical	27.321 582	=27	7	43	4.7	Hansen.
Sidereal	27 321 661	=27	7	43	11.5	Hansen.
Anomalistic	27.554 550	=27	13	18	33.1	Hansen.
Nodical	27.212 219	=27	5	5	35.7	Hansen.

Length of the day:

	h	m	s	
Sidereal	23	56	4.091	of mean solar time.
Mean Solar	24	3	56.555	of sidereal time.

Dimensions of the Earth (Hayford's Spheroid of 1909):

Equatorial Radius, $a=6378.388$ kilometers or 3963.34 statute miles.
Polar Radius, $b=6356.909$ " or 3949.99 " "

Flattening, $\frac{a-b}{a}=\frac{1}{297.0}$

Logarithm of the eccentricity $\frac{\sqrt{a^2-b^2}}{a}=\log e=8.913\ 804$

Logarithm radius=$\log \rho=9.999\ 2695+0.000\ 7324\cos 2\varphi-0.000\ 0019\cos 4\varphi$.
Reduction from geographic latitude φ to geocentric latitude φ',

$$\varphi'-\varphi=-11'\ 35''.66\sin 2\varphi+1''.17\sin 4\varphi.$$

1 degree of latitude (in statute miles)=$69.0569-0.3494\cos 2\varphi+0.0007\cos 4\varphi$.
1 degree of longitude (in statute miles)=$69.2316\cos\varphi-0.0584\cos 3\varphi+0.0001\cos 5\varphi$.

1 meter=3.280 8333 feet. 1 foot=0.304 8006 meters.
1 statute mile=0.868 362 nautical or geographical miles.
1 nautical mile=1.151 594 statute miles.

* Used in the computation of eclipses. The parallax used in the computation of the ephemeris of the Moon contained in this volume is $57'\ 2''.23$ (Hansen).
† k^2 is the acceleration due to the Sun's attraction at the mean distance of the Earth from the Sun, which is also the astronomical unit of distance, the unit of time being one mean solar day.
‡ φ=latitude, h=elevation above sea level in meters, and log R=6.80416.

NOTE.—The above values of $\log\rho$ and $\varphi'-\varphi$ were computed with the eccentricity that results from assuming that the flattening of the earth is exactly $\frac{1}{297}$.

ASTRONOMICAL CONSTANTS.

SEMIDIAMETERS OF THE SUN, MOON, AND PLANETS.

Name.	At Unit Distance. ′ ″	At Mean Least Distance. ″	In Kilometers.	In Statute Miles.	Authority.
. . . .	15 59.63	. .	695 553.46	432 196.01	Auwers.
. . . .	15 32.58*	. .	1 738.02	1 079.96	Newcomb.
ry	3.34	5.45	2 420.89	1 504.27	Le Verrier.
. . . .	8.55	30.90	6 197.18	3 850.74	Peirce.
. . . .	5.05	9.64	3 660.32	2 274.42	Peirce.
r (Equatorial)	1 40.20	23.84	72 626.64	45 128.01	Am. Eph.
r (Polar)	1 34.12	22.40	68 219.76	42 389.71	Peirce.
ι (Equatorial)	1 24.88	9.94	61 522.45	38 228.20	Barnard.
ι (Polar)	1 17.47	9.07	56 151.56	34 890.89	Barnard.
s	33.52	1.84	24 295.86	15 096.72	Am. Eph.
ne	38.66	1.33	28 021.42	17 411.67	Am. Eph.

ENTS OF THE PLANETARY ORBITS FOR THE EPOCH 1919—January 0^d G. M. T.

Name.	Mean Distance.	Sidereal Period in Tropical Years.	Sidereal Mean Daily Motion. ″	Synodic Period in Tropical Years.	Eccentricity.
rcury	0.387 099	0.240 85	14 732.420	0.317 26	0.205 6181
nus	0.723 331	0.615 21	5 767.670	1.598 72	0.006 8116
rth	1.000 000	1.000 04	3 548.193	. . .	0.016 7431
rs	1.523 688	1.880 89	1 886.519	2.135 39	0.093 3262
piter	5.202 803	11.862 23	299.128	1.092 11	0.048 3686
turn	9.538 843	29.457 72	120.455	1.035 18	0.055 8241
anus	19.190 978	84.015 29	42.23	1.012 09	0.047 0978
ptune	30.070 672	164.788 29	21.53	1.006 14	0.008 5454

Name.	Inclination to the Ecliptic. ° ′ ″	Mean Longitude of the Node. ° ′ ″	Mean Longitude of the Perihelion. ° ′ ″	Mean Longitude at the Epoch. ° ′ ″	Logarithm of Mass in Unit of Sun's Mass.
rcury . . .	7 0 11.6	47 22 16.0	76 11 42.8	135 10 59.71	3.221 8487−10
nus . . .	3 23 37.8	75 57 2.2	130 25 52.7	300 12 56.52	4.389 3398−10
rth . . .	. . . . .	. . . . .	101 32 50.9	99 6 12.78	4.482 2896−10
rs . . .	1 51 0.9	48 55 56.9	334 34 5.4	330 16 38.76	3.509 5499−10
piter . . .	1 18 27.7	99 37 47.9	13 1 3.6	94 53 5.72	6.979 9082−10
urn . . .	2 29 29.6	112 56 57.3	91 27 39.2	139 0 24.68	6.455 7335−10
anus . . .	0 46 22.0	73 35 8.9	169 21 9.6	325 2 6.33	5.640 7528−10
ptune . .	1 46 38.8	130 53 15.8	43 55 18.0	126 47 41.52	5.705 5338−10

The elements of the four inner planets are derived from those given by COMB in Vol. VI of the *Astronomical Papers of the American Ephemeris*, are the same as those used in computing the ephemerides of these planets. e of Jupiter, Saturn, Uranus, and Neptune are taken from Vol. VII of *Astronomical Papers* for the epoch of the tables. They are reduced to by applying LE VERRIER's variations, and can not be regarded as being ly identical with the elements used in computing the ephemerides of those ts in this volume.

At mean distance. See *Ast. Papers Am. Eph.*, Vol. IX, p. 39. For the values of the semidiameter used in ame see page xi.

5934°—1919——II

SYMBOLS AND ABBREVIATIONS.

SIGNS OF THE PLANETS, ETC.

☉	The Sun.	♂	Mars.
☾	The Moon.	♃	Jupiter.
☿	Mercury.	♄	Saturn.
♀	Venus.	♅	Uranus.
⊕	The Earth.	♆	Neptune.

SIGNS OF THE ZODIAC.

Spring Signs.	1. ♈	Aries.		Autumn Signs.	7. ♎	Libra.
	2. ♉	Taurus.			8. ♏	Scorpius.
	3. ♊	Gemini.			9. ♐	Sagittariu
Summer Signs.	4. ♋	Cancer.		Winter Signs.	10. ♑	Capricorn
	5. ♌	Leo.			11. ♒	Aquarius.
	6. ♍	Virgo.			12. ♓	Pisces.

ASPECTS.

☌ Conjunction, or having the same Longitude or Right Ascension.
□ Quadrature, or differing $\pm 90°$ in Longitude or Right Ascension.
☍ Opposition, or differing 180° in Longitude or Right Ascension.

ABBREVIATIONS.

☊	Ascending Node.	$^\circ$	Degrees.
☋	Descending Node.	$'$	Minutes of Arc.
N.	North.	$''$	Seconds of Arc.
S.	South.	^{h}	Hours.
E.	East.	^{m}	Minutes of Time.
W.	West.	^{s}	Seconds of Time.

PART I.

ASTRONOMICAL EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

FOR GREENWICH MEAN NOON.

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
Jan. 1	1	280 2 26.4	152.95	+0.09	9.992 6918	− 1.3	0.01	+16.92	20.81	56.00	5 18 46.56
2	2	281 3 37.3	152.95	0.22	9.992 6895	− 0.6	0.15	16.96	20.81	56.00	5 14 50.65
3	3	282 4 48.3	152.95	0.33	9.992 6889	+ 0.1	0.29	17.00	20.81	56.00	5 10 54.73
4	4	283 5 59.2	152.95	0.41	9.992 6900	0.8	0.42	17.04	20.81	56.00	5 6 58.82
5	5	284 7 9.8	152.94	0.47	9.992 6928	1.5	0.56	17.08	20.81	56.00	5 3 2.91
6	6	285 8 20.2	152.93	+0.49	9.992 6973	+ 2.3	0.70	+17.12	20.81	56.00	4 59 7.00
7	7	286 9 30.2	152.91	0.48	9.992 7037	3.0	0.84	17.16	20.81	56.00	4 55 11.09
8	8	287 10 39.7	152.89	0.44	9.992 7121	4.0	0.97	17.19	20.81	56.00	4 51 15.18
9	9	288 11 48.8	152.86	0.38	9.992 7227	4.9	1.11	17.22	20.81	56.00	4 47 19.26
10	10	289 12 57.2	152.84	0.29	9.992 7354	5.8	1.25	17.26	20.81	56.00	4 43 23.35
11	11	290 14 5.1	152.81	+0.17	9.992 7506	+ 6.9	1.39	+17.29	20.81	56.00	4 39 27.44
12	12	291 15 12.4	152.79	+0.03	9.992 7683	8.0	1.53	17.33	20.81	56.01	4 35 31.53
13	13	292 16 19.0	152.76	−0.11	9.992 7887	9.1	1.66	17.36	20.81	56.01	4 31 35.62
14	14	293 17 25.1	152.74	0.25	9.992 8118	10.2	1.80	17.39	20.81	56.02	4 27 39.71
15	15	294 18 30.6	152.72	0.37	9.992 8377	11.4	1.94	17.42	20.80	56.02	4 23 43.80
16	16	295 19 35.5	152.70	−0.48	9.992 8664	+12.6	2.08	+17.44	20.80	56.03	4 19 47.88
17	17	296 20 40.0	152.68	0.56	9.992 8980	13.7	2.21	17.47	20.80	56.03	4 15 51.97
18	18	297 21 44.0	152.66	0.62	9.992 9323	14.9	2.35	17.49	20.80	56.04	4 11 56.06
19	19	298 22 47.5	152.64	0.65	9.992 9694	16.0	2.49	17.52	20.80	56.05	4 8 0.15
20	20	299 23 50.6	152.62	0.65	9.993 0091	17.1	2.63	17.54	20.80	56.06	4 4 4.24
21	21	300 24 53.2	152.60	−0.63	9.993 0513	+18.1	2.76	+17.56	20.79	56.06	4 0 8.33
22	22	301 25 55.4	152.58	0.58	9.993 0958	19.0	2.90	17.58	20.79	56.07	3 56 12.42
23	23	302 26 57.1	152.56	0.51	9.993 1427	20.0	3.04	17.60	20.79	56.08	3 52 16.51
24	24	303 27 58.3	152.54	0.41	9.993 1917	20.9	3.18	17.61	20.79	56.09	3 48 20.60
25	25	304 28 59.0	152.52	0.30	9.993 2428	21.7	3.31	17.63	20.79	56.10	3 44 24.69
26	26	305 29 59.1	152.49	−0.18	9.993 2958	+22.5	3.45	+17.64	20.78	56.11	3 40 28.78
27	27	306 30 58.6	152.46	−0.05	9.993 3506	23.2	3.59	17.65	20.78	56.11	3 36 32.87
28	28	307 31 57.4	152.43	+0.07	9.993 4072	23.9	3.73	17.66	20.78	56.12	3 32 36.96
29	29	308 32 55.4	152.40	0.19	9.993 4654	24.5	3.86	17.67	20.77	56.13	3 28 41.05
30	30	309 33 52.7	152.37	0.30	9.993 5250	25.1	4.00	17.68	20.77	56.14	3 24 45.14
31	31	310 34 49.0	152.33	+0.39	9.993 5860	+25.7	4.14	+17.68	20.77	56.15	3 20 49.23
Feb. 1	32	311 35 44.3	152.28	0.45	9.993 6483	26.2	4.28	17.69	20.77	56.17	3 16 53.32
2	33	312 36 38.5	152.23	0.49	9.993 7120	26.8	4.42	17.69	20.76	56.18	3 12 57.41
3	34	313 37 31.5	152.18	0.49	9.993 7769	27.3	4.55	17.69	20.76	56.19	3 9 1.50
4	35	314 38 23.2	152.12	0.46	9.993 8432	27.9	4.69	17.69	20.76	56.20	3 5 5.59
5	36	315 39 13.4	152.06	+0.40	9.993 9109	+28.5	4.83	+17.68	20.75	56.21	3 1 9.68
6	37	316 40 2.2	152.00	0.32	9.993 9801	29.2	4.97	17.68	20.75	56.22	2 57 13.77
7	38	317 40 49.5	151.94	0.21	9.994 0509	29.9	5.10	17.67	20.75	56.23	2 53 17.86
8	39	318 41 35.2	151.87	+0.08	9.994 1235	30.7	5.24	17.66	20.74	56.24	2 49 21.95
9	40	319 42 19.3	151.81	−0.05	9.994 1980	31.5	5.38	17.65	20.74	56.25	2 45 26.04
10	41	320 43 1.8	151.74	−0.18	9.994 2745	+32.3	5.52	+17.64	20.74	56.26	2 41 30.13
11	42	321 43 42.8	151.67	0.30	9.994 3530	33.2	5.65	17.63	20.73	56.27	2 37 34.23
12	43	322 44 22.1	151.61	0.41	9.994 4338	34.1	5.79	17.62	20.73	56.28	2 33 38.32
13	44	323 44 59.9	151.54	0.49	9.994 5167	35.0	5.93	17.60	20.72	56.29	2 29 42.41
14	45	324 45 36.1	151.48	0.55	9.994 6018	35.9	6.07	17.58	20.72	56.30	2 25 46.50
15	46	325 46 10.9	151.42	−0.59	9.994 6891	+36.8	6.20	+17.56	20.72	56.31	2 21 50.59
16	47	326 46 44.2	151.36	−0.60	9.994 7786	+37.7	6.34	+17.54	20.71	56.32	2 17 54.68

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	′ ″	″	m s	s	h m s
Feb. 16	Su	21 55 59.08	9.719	−12 35 40.6	+51.63	16 13.12	8.91	−14 16.42	+0.137	21 41 42.66
17	Mo	21 59 51.99	9.690	12 14 55.6	52.13	16 12.92	8.90	14 12.78	0.167	21 45 39.21
18	Tu	22 3 44.20	9.661	11 53 58.7	52.61	16 12.71	8.90	14 8.43	0.196	21 49 35.77
19	We	22 7 35.72	9.633	11 32 50.5	53.07	16 12.50	8.90	14 3.40	0.224	21 53 32.32
20	Th	22 11 26.57	9.605	11 11 31.4	53.52	16 12.28	8.90	13 57.70	0.251	21 57 28.88
21	Fr	22 15 16.77	9.578	−10 50 1.6	+53.96	16 12.06	8.90	−13 51.34	+0.278	22 1 25.43
22	Sa	22 19 6.32	9.552	10 28 21.7	54.37	16 11.83	8.89	13 44.34	0.305	22 5 21.98
23	Su	22 22 55.25	9.526	10 6 32.1	54.76	16 11.61	8.89	13 36.71	0.331	22 9 18.54
24	Mo	22 26 43.57	9.501	9 44 33.1	55.15	16 11.37	8.89	13 28.48	0.355	22 13 15.09
25	Tu	22 30 31.30	9.477	9 22 25.1	55.51	16 11.14	8.89	13 19.66	0.380	22 17 11.64
26	We	22 34 18.46	9.453	− 9 0 8.7	+55.85	16 10.91	8.89	−13 10.26	+0.403	22 21 8.20
27	Th	22 38 5.05	9.430	8 37 44.2	56.19	16 10.67	8.88	13 0.30	0.426	22 25 4.75
28	Fr	22 41 51.10	9.408	8 15 11.9	56.50	16 10.43	8.88	12 49.80	0.449	22 29 1.30
Mar. 1	Sa	22 45 36.62	9.386	7 52 32.4	56.79	16 10.19	8.88	12 38.76	0.471	22 32 57.86
2	Su	22 49 21.62	9.364	7 29 46.0	57.07	16 9.95	8.88	12 27.21	0.492	22 36 54.41
3	Mo	22 53 6.11	9.343	− 7 6 53.3	+57.32	16 9.70	8.88	−12 15.15	+0.513	22 40 50.96
4	Tu	22 56 50.11	9.323	6 43 54.6	57.57	16 9.46	8.87	12 2.60	0.533	22 44 47.52
5	We	23 0 33.64	9.304	6 20 50.3	57.79	16 9.22	8.87	11 49.57	0.553	22 48 44.07
6	Th	23 4 16.70	9.285	5 57 40.8	58.00	16 8.97	8.87	11 36.08	0.571	22 52 40.62
7	Fr	23 7 59.32	9.267	5 34 26.6	58.19	16 8.73	8.87	11 22.15	0.589	22 56 37.17
8	Sa	23 11 41.51	9.249	− 5 11 8.0	+58.36	16 8.48	8.86	−11 7.79	+0.607	23 0 33.73
9	Su	23 15 23.30	9.233	4 47 45.4	58.52	16 8.23	8.86	10 53.02	0.624	23 4 30.28
10	Mo	23 19 4.69	9.217	4 24 19.2	58.66	16 7.98	8.86	10 37.85	0.640	23 8 26.83
11	Tu	23 22 45.71	9.202	4 0 49.8	58.79	16 7.72	8.86	10 22.32	0.654	23 12 23.38
12	We	23 26 26.38	9.188	3 37 17.5	58.90	16 7.47	8.85	10 6.45	0.668	23 16 19.94
13	Th	23 30 6.73	9.175	− 3 13 42.7	+59.00	16 7.21	8.85	− 9 50.25	+0.682	23 20 16.49
14	Fr	23 33 46.78	9.163	2 50 5.8	59.08	16 6.95	8.85	9 33.74	0.694	23 24 13.04
15	Sa	23 37 26.55	9.152	2 26 27.0	59.15	16 6.69	8.85	9 16.96	0.705	23 28 9.59
16	Su	23 41 6.07	9.142	2 2 46.8	59.20	16 6.42	8.85	8 59.92	0.715	23 32 6.15
17	Mo	23 44 45.35	9.132	1 39 5.5	59.24	16 6.15	8.84	8 42.65	0.724	23 36 2.70
18	Tu	23 48 24.43	9.124	− 1 15 23.4	+59.27	16 5.88	8.84	− 8 25.18	+0.732	23 39 59.25
19	We	23 52 3.33	9.117	0 51 40.9	59.28	16 5.61	8.84	8 7.52	0.739	23 43 55.80
20	Th	23 55 42.06	9.111	0 27 58.3	59.27	16 5.33	8.84	7 49.70	0.745	23 47 52.36
21	Fr	23 59 20.66	9.106	− 0 4 16.0	59.25	16 5.06	8.83	7 31.75	0.751	23 51 48.91
22	Sa	0 2 59.14	9.101	+ 0 19 25.6	59.21	16 4.78	8.83	7 13.68	0.755	23 55 45.46
23	Su	0 6 37.53	9.098	+ 0 43 6.2	+59.16	16 4.50	8.83	− 6 55.52	+0.758	23 59 42.01
24	Mo	0 10 15.85	9.095	1 6 45.4	59.10	16 4.22	8.82	6 37.28	0.761	0 3 38.56
25	Tu	0 13 54.12	9.094	1 30 22.9	59.02	16 3.94	8.82	6 19.00	0.762	0 7 35.12
26	We	0 17 32.36	9.093	1 53 58.3	58.93	16 3.66	8.82	6 0.69	0.763	0 11 31.67
27	Th	0 21 10.59	9.093	2 17 31.3	58.82	16 3.37	8.82	5 42.37	0.763	0 15 28.22
28	Fr	0 24 48.84	9.094	+ 2 41 1.5	+58.69	16 3.09	8.81	− 5 24.06	+0.762	0 19 24.77
29	Sa	0 28 27.11	9.095	3 4 28.5	58.55	16 2.81	8.81	5 5.78	0.761	0 23 21.33
30	Su	0 32 5.43	9.098	3 27 52.0	58.40	16 2.53	8.81	4 47.55	0.758	0 27 17.88
31	Mo	0 35 43.81	9.101	3 51 11.5	58.23	16 2.25	8.81	4 29.38	0.755	0 31 14.43
Apr. 1	Tu	0 39 22.27	9.104	4 14 26.7	58.04	16 1.98	8.80	4 11.29	0.752	0 35 10.98
2	We	0 43 0.82	9.108	+ 4 37 37.3	+57.84	16 1.70	8.80	− 3 53.28	+0.748	0 39 7.54
3	Th	0 46 39.47	9.113	+ 5 0 42.7	+57.62	16 1.43	8.80	− 3 35.38	+0.743	0 43 4.09

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
Feb. 16	47	326 46 44.2	151.36	−0.60	9.994 7786	+37.7	6.34	+17.54	20.71	56.32	2 17 54.68
17	48	327 47 16.2	151.30	0.58	9.994 8702	38.6	6.48	17.52	20.71	56.33	2 13 58.78
18	49	328 47 46.7	151.24	0.52	9.994 9638	39.4	6.62	17.50	20.70	56.33	2 10 2.87
19	50	329 48 15.8	151.19	0.45	9.995 0593	40.2	6.75	17.47	20.70	56.34	2 6 6.96
20	51	330 48 43.6	151.13	0.36	9.995 1566	40.9	6.89	17.44	20.69	56.35	2 2 11.05
21	52	331 49 10.0	151.07	−0.25	9.995 2556	+41.6	7.03	+17.42	20.69	56.36	1 58 15.14
22	53	332 49 35.0	151.01	0.13	9.995 3561	42.2	7.17	17.39	20.68	56.36	1 54 19.24
23	54	333 49 58.7	150.96	−0.01	9.995 4580	42.7	7.31	17.36	20.68	56.37	1 50 23.33
24	55	334 50 21.0	150.90	+0.12	9.995 5613	43.3	7.44	17.32	20.67	56.38	1 46 27.42
25	56	335 50 41.8	150.84	0.24	9.995 6657	43.7	7.58	17.29	20.67	56.38	1 42 31.51
26	57	336 51 1.2	150.78	+0.34	9.995 7712	+44.1	7.72	+17.26	20.66	56.39	1 38 35.61
27	58	337 51 19.0	150.71	0.43	9.995 8775	44.4	7.86	17.22	20.66	56.39	1 34 39.70
28	59	338 51 35.4	150.65	0.50	9.995 9845	44.7	7.99	17.18	20.65	56.40	1 30 43.79
Mar. 1	60	339 51 50.0	150.58	0.55	9.996 0921	44.9	8.13	17.15	20.65	56.40	1 26 47.88
2	61	340 52 3.0	150.50	0.56	9.996 2001	45.1	8.27	17.11	20.64	56.40	1 22 51.98
3	62	341 52 14.2	150.43	+0.53	9.996 3086	+45.3	8.41	+17.07	20.64	56.41	1 18 56.07
4	63	342 52 23.4	150.34	0.47	9.996 4175	45.5	8.54	17.03	20.63	56.41	1 15 0.16
5	64	343 52 30.7	150.26	0.38	9.996 5268	45.7	8.68	16.98	20.63	56.41	1 11 4.26
6	65	344 52 35.9	150.17	0.28	9.996 6366	45.9	8.82	16.94	20.62	56.41	1 7 8.35
7	66	345 52 38.9	150.08	0.16	9.996 7470	46.2	8.96	16.90	20.62	56.41	1 3 12.44
8	67	346 52 39.8	149.99	+0.03	9.996 8581	+46.5	9.09	+16.85	20.61	56.41	0 59 16.54
9	68	347 52 38.5	149.90	−0.10	9.996 9700	46.8	9.23	16.81	20.61	56.41	0 55 20.63
10	69	348 52 34.9	149.81	0.22	9.997 0827	47.2	9.37	16.76	20.60	56.41	0 51 24.72
11	70	349 52 29.1	149.71	0.33	9.997 1965	47.6	9.51	16.71	20.60	56.41	0 47 28.82
12	71	350 52 21.2	149.62	0.42	9.997 3113	48.1	9.64	16.67	20.59	56.41	0 43 32.91
13	72	351 52 11.1	149.53	−0.49	9.997 4273	+48.6	9.78	+16.62	20.59	56.40	0 39 37.00
14	73	352 51 58.8	149.45	0.53	9.997 5445	49.1	9.92	16.57	20.58	56.40	0 35 41.10
15	74	353 51 44.5	149.36	0.53	9.997 6628	49.6	10.06	16.53	20.57	56.40	0 31 45.19
16	75	354 51 28.1	149.28	0.51	9.997 7824	50.1	10.19	16.48	20.57	56.39	0 27 49.28
17	76	355 51 9.8	149.20	0.46	9.997 9031	50.5	10.33	16.43	20.56	56.38	0 23 53.38
18	77	356 50 49.5	149.11	−0.39	9.998 0249	+51.0	10.47	+16.38	20.56	56.38	0 19 57.47
19	78	357 50 27.3	149.04	0.29	9.998 1477	51.4	10.61	16.33	20.55	56.37	0 16 1.56
20	79	358 50 3.2	148.96	0.18	9.998 2714	51.7	10.75	16.28	20.55	56.36	0 12 5.66
21	80	359 49 37.3	148.88	−0.06	9.998 3960	52.1	10.88	16.23	20.54	56.35	0 8 9.75
22	81	0 49 9.5	148.81	+0.06	9.998 5213	52.4	11.02	16.18	20.53	56.34	0 4 13.85
23	82	1 48 40.0	148.73	+0.18	9.998 6473	+52.6	11.16	+16.13	20.53	56.33	0 0 17.94 23 56 22.03
24	83	2 48 8.7	148.66	0.30	9.998 7737	52.7	11.30	16.08	20.52	56.32	23 52 26.13
25	84	3 47 35.6	148.59	0.41	9.998 9004	52.9	11.43	16.03	20.52	56.31	23 48 30.22
26	85	4 47 0.8	148.51	0.51	9.999 0274	52.9	11.57	15.98	20.51	56.30	23 44 34.31
27	86	5 46 24.2	148.44	0.58	9.999 1543	52.9	11.71	15.93	20.50	56.29	23 40 38.41
28	87	6 45 45.9	148.36	+0.62	9.999 2812	+52.8	11.85	+15.88	20.50	56.27	23 36 42.50
29	88	7 45 5.7	148.29	0.63	9.999 4077	52.6	11.98	15.84	20.49	56.26	23 32 46.59
30	89	8 44 23.7	148.21	0.60	9.999 5337	52.4	12.12	15.79	20.49	56.25	23 28 50.69
31	90	9 43 39.7	148.12	0.55	9.999 6592	52.1	12.26	15.74	20.48	56.23	23 24 54.78
Apr. 1	91	10 42 53.7	148.04	0.47	9.999 7840	51.9	12.40	15.69	20.47	56.21	23 20 58.87
2	92	11 42 5.6	147.95	+0.37	9.999 9081	+51.6	12.53	+15.65	20.47	56.20	23 17 2.96
3	93	12 41 15.3	147.86	+0.25	0.000 0316	+51.3	12.67	+15.60	20.46	56.18	23 13 7.0[illegible]

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	′ ″	″	m s	s	h m s
Apr. 1	Tu	0 39 22.27	9.104	+ 4 14 26.7	+58.04	16 1.98	8.80	−4 11.29	+0.752	0 35 10.96
2	We	0 43 0.82	9.108	4 37 37.3	57.84	16 1.70	8.80	3 53.28	0.748	0 39 7.54
3	Th	0 46 39.47	9.113	5 0 42.7	57.62	16 1.43	8.80	3 35.38	0.743	0 43 4.09
4	Fr	0 50 18.24	9.118	5 23 42.8	57.39	16 1.16	8.80	3 17.60	0.738	0 47 0.64
5	Sa	0 53 57.15	9.124	5 46 37.1	57.14	16 0.89	8.79	2 59.96	0.732	0 50 57.19
6	Su	0 57 36.21	9.131	+ 6 9 25.2	+56.87	16 0.62	8.79	−2 42.46	+0.726	0 54 53.75
7	Mo	1 1 15.43	9.138	6 32 6.9	56.60	16 0.35	8.79	2 25.14	0.718	0 58 50.30
8	Tu	1 4 54.85	9.147	6 54 41.7	56.31	16 0.08	8.79	2 8.00	0.710	1 2 46.85
9	We	1 8 34.47	9.155	7 17 9.5	56.00	15 59.81	8.78	1 51.06	0.701	1 6 43.40
10	Th	1 12 14.31	9.165	7 39 29.7	55.68	15 59.55	8.78	1 34.35	0.691	1 10 39.96
11	Fr	1 15 54.39	9.175	+ 8 1 42.2	+55.35	15 59.28	8.78	−1 17.88	+0.681	1 14 36.51
12	Sa	1 19 34.74	9.187	8 23 46.5	55.01	15 59.01	8.78	1 1.68	0.669	1 18 33.06
13	Su	1 23 15.37	9.199	8 45 42.5	54.65	15 58.74	8.78	0 45.76	0.657	1 22 29.62
14	Mo	1 26 56.30	9.212	9 7 29.6	54.28	15 58.48	8.77	0 30.14	0.644	1 26 26.17
15	Tu	1 30 37.56	9.226	9 29 7.7	53.89	15 58.21	8.77	−0 14.84	0.631	1 30 22.72
16	We	1 34 19.15	9.240	+ 9 50 36.4	+53.50	15 57.94	8.77	+0 0.12	+0.616	1 34 19.28
17	Th	1 38 1.11	9.256	10 11 55.4	53.08	15 57.67	8.77	0 14.72	0.601	1 38 15.83
18	Fr	1 41 43.44	9.272	10 33 4.3	52.66	15 57.41	8.76	0 28.94	0.584	1 42 12.38
19	Sa	1 45 26.16	9.289	10 54 2.9	52.22	15 57.14	8.76	0 42.77	0.568	1 46 8.94
20	Su	1 49 9.30	9.306	11 14 50.8	51.77	15 56.87	8.76	0 56.19	0.550	1 50 5.49
21	Mo	1 52 52.87	9.324	+11 35 27.7	+51.30	15 56.61	8.76	+1 9.18	+0.532	1 54 2.04
22	Tu	1 56 36.87	9.343	11 55 53.2	50.82	15 56.34	8.75	1 21.72	0.513	1 57 58.60
23	We	2 0 21.34	9.363	12 16 7.0	50.33	15 56.08	8.75	1 33.81	0.494	2 1 55.15
24	Th	2 4 6.28	9.382	12 36 8.8	49.82	15 55.82	8.75	1 45.43	0.474	2 5 51.70
25	Fr	2 7 51.70	9.403	12 55 58.3	49.30	15 55.56	8.75	1 56.56	0.454	2 9 48.26
26	Sa	2 11 37.61	9.423	+13 15 35.1	+48.76	15 55.31	8.74	+2 7.20	+0.433	2 13 44.81
27	Su	2 15 24.03	9.445	13 34 58.9	48.22	15 55.05	8.74	2 17.33	0.412	2 17 41.37
28	Mo	2 19 10.96	9.466	13 54 9.4	47.65	15 54.80	8.74	2 26.96	0.390	2 21 37.92
29	Tu	2 22 58.41	9.488	14 13 6.1	47.07	15 54.56	8.74	2 36.07	0.369	2 25 34.47
30	We	2 26 46.37	9.509	14 31 48.8	46.48	15 54.31	8.73	2 44.66	0.347	2 29 31.03
May 1	Th	2 30 34.86	9.531	+14 50 17.1	+45.88	15 54.07	8.73	+2 52.72	+0.325	2 33 27.58
2	Fr	2 34 23.88	9.553	15 8 30.7	45.25	15 53.84	8.73	3 0.26	0.303	2 37 24.14
3	Sa	2 38 13.42	9.575	15 26 29.2	44.62	15 53.61	8.73	3 7.28	0.281	2 41 20.69
4	Su	2 42 3.49	9.597	15 44 12.4	43.98	15 53.38	8.73	3 13.76	0.259	2 45 17.25
5	Mo	2 45 54.10	9.620	16 1 39.9	43.31	15 53.15	8.72	3 19.70	0.236	2 49 13.80
6	Tu	2 49 45.24	9.642	+16 18 51.4	+42.64	15 52.93	8.72	+3 25.11	+0.214	2 53 10.36
7	We	2 53 36.93	9.665	16 35 46.6	41.96	15 52.71	8.72	3 29.98	0.192	2 57 6.91
8	Th	2 57 29.16	9.688	16 52 25.2	41.26	15 52.49	8.72	3 34.30	0.169	3 1 3.47
9	Fr	3 1 21.95	9.711	17 8 46.9	40.55	15 52.28	8.72	3 38.07	0.146	3 5 0.02
10	Sa	3 5 15.29	9.734	17 24 51.5	39.83	15 52.07	8.71	3 41.29	0.123	3 8 56.58
11	Su	3 9 9.19	9.757	+17 40 38.6	+39.09	15 51.86	8.71	+3 43.95	+0.099	3 12 53.13
12	Mo	3 13 3.65	9.781	17 56 7.9	38.35	15 51.65	8.71	3 46.04	0.075	3 16 49.69
13	Tu	3 16 58.68	9.805	18 11 19.2	37.59	15 51.45	8.71	3 47.56	0.052	3 20 46.24
14	We	3 20 54.28	9.829	18 26 12.2	36.82	15 51.24	8.71	3 48.52	0.028	3 24 42.80
15	Th	3 24 50.45	9.852	18 40 46.6	36.04	15 51.04	8.70	3 48.91	+0.004	3 28 39.35
16	Fr	3 28 47.19	9.876	+18 55 2.1	+35.25	15 50.84	8.70	+3 48.73	−0.020	3 32 35.91
17	*Sa*	*3 32 44.50*	*9.900*	*+19 8 58.5*	+34.45	15 50.64	8.70	+3 47.97	−0.044	3 36 32.47

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
Apr. 1	91	10 42 53.7	148.04	+0.47	9.999 7840	+51.9	12.40	+15.69	20.47	56.21	23 20 58.87
2	92	11 42 5.6	147.95	0.37	9.999 9081	51.6	12.53	15.65	20.47	56.20	23 17 2.96
3	93	12 41 15.3	147.86	0.25	0.000 0316	51.3	12.67	15.60	20.46	56.18	23 13 7.06
4	94	13 40 22.8	147.76	+0.12	0.000 1544	51.1	12.81	15.55	20.46	56.16	23 9 11.15
5	95	14 39 28.0	147.67	−0.01	0.000 2767	50.9	12.95	15.51	20.45	56.15	23 5 15.24
6	96	15 38 30.8	147.57	−0.14	0.000 3985	+50.7	13.08	+15.46	20.45	56.13	23 1 19.34
7	97	16 37 31.4	147.48	0.26	0.000 5200	50.6	13.22	15.42	20.44	56.11	22 57 23.43
8	98	17 36 29.6	147.38	0.36	0.000 6413	50.5	13.36	15.38	20.43	56.09	22 53 27.52
9	99	18 35 25.5	147.28	0.43	0.000 7625	50.5	13.50	15.34	20.43	56.07	22 49 31.62
10	100	19 34 19.2	147.19	0.47	0.000 8836	50.5	13.64	15.30	20.42	56.05	22 45 35.71
11	101	20 33 10.6	147.10	−0.48	0.001 0047	+50.5	13.77	+15.26	20.42	56.03	22 41 39.80
12	102	21 31 59.8	147.01	0.47	0.001 1258	50.5	13.91	15.22	20.41	56.01	22 37 43.90
13	103	22 30 46.9	146.92	0.42	0.001 2470	50.5	14.05	15.18	20.41	55.98	22 33 47.99
14	104	23 29 32.0	146.83	0.34	0.001 3683	50.6	14.19	15.14	20.40	55.96	22 29 52.08
15	105	24 28 15.0	146.75	0.25	0.001 4897	50.6	14.32	15.10	20.39	55.94	22 25 56.17
16	106	25 26 56.0	146.67	−0.15	0.001 6110	+50.5	14.46	+15.07	20.39	55.91	22 22 0.27
17	107	26 25 35.2	146.59	−0.03	0.001 7323	50.5	14.60	15.04	20.38	55.89	22 18 4.36
18	108	27 24 12.4	146.52	+0.10	0.001 8536	50.5	14.74	15.00	20.38	55.87	22 14 8.45
19	109	28 22 48.0	146.44	0.23	0.001 9747	50.4	14.87	14.97	20.37	55.84	22 10 12.54
20	110	29 21 21.7	146.37	0.36	0.002 0955	50.3	15.01	14.94	20.37	55.82	22 6 16.64
21	111	30 19 53.8	146.30	+0.48	0.002 2159	+50.1	15.15	+14.91	20.36	55.79	22 2 20.73
22	112	31 18 24.2	146.24	0.58	0.002 3359	49.9	15.29	14.88	20.35	55.77	21 58 24.82
23	113	32 16 53.0	146.17	0.65	0.002 4552	49.6	15.42	14.86	20.35	55.74	21 54 28.91
24	114	33 15 20.3	146.10	0.69	0.002 5738	49.2	15.56	14.83	20.34	55.71	21 50 33.01
25	115	34 13 45.9	146.04	0.70	0.002 6914	48.8	15.70	14.81	20.34	55.69	21 46 37.10
26	116	35 12 10.0	145.97	+0.69	0.002 8079	+48.3	15.84	+14.79	20.33	55.66	21 42 41.19
27	117	36 10 32.5	145.90	0.65	0.002 9231	47.7	15.97	14.77	20.33	55.63	21 38 45.28
28	118	37 8 53.4	145.84	0.58	0.003 0369	47.1	16.11	14.75	20.32	55.61	21 34 49.37
29	119	38 7 12.7	145.77	0.48	0.003 1491	46.4	16.25	14.73	20.32	55.58	21 30 53.47
30	120	39 5 30.2	145.69	0.36	0.003 2596	45.7	16.39	14.71	20.31	55.55	21 26 57.56
May 1	121	40 3 45.9	145.62	+0.23	0.003 3685	+45.0	16.52	+14.69	20.31	55.52	21 23 1.65
2	122	41 1 59.8	145.54	+0.09	0.003 4756	44.3	16.66	14.68	20.30	55.50	21 19 5.74
3	123	42 0 11.7	145.46	−0.05	0.003 5812	43.7	16.80	14.67	20.30	55.47	21 15 9.83
4	124	42 58 21.7	145.38	0.17	0.003 6852	43.0	16.94	14.65	20.29	55.44	21 11 13.92
5	125	43 56 29.8	145.30	0.27	0.003 7877	42.4	17.08	14.64	20.29	55.41	21 7 18.01
6	126	44 54 35.9	145.21	−0.35	0.003 8889	+41.9	17.21	+14.64	20.28	55.38	21 3 22.10
7	127	45 52 40.0	145.13	0.40	0.003 9889	41.4	17.35	14.63	20.28	55.36	20 59 26.20
8	128	46 50 42.2	145.05	0.42	0.004 0877	41.0	17.49	14.62	20.27	55.33	20 55 30.29
9	129	47 48 42.6	144.98	0.41	0.004 1855	40.5	17.63	14.62	20.27	55.30	20 51 34.38
10	130	48 46 41.1	144.90	0.37	0.004 2823	40.1	17.76	14.62	20.26	55.27	20 47 38.47
11	131	49 44 37.8	144.83	−0.30	0.004 3782	+39.8	17.90	+14.61	20.26	55.25	20 43 42.56
12	132	50 42 32.8	144.76	0.21	0.004 4732	39.4	18.04	14.61	20.25	55.22	20 39 46.65
13	133	51 40 26.2	144.69	−0.10	0.004 5674	39.0	18.18	14.61	20.25	55.19	20 35 50.74
14	134	52 38 18.0	144.63	+0.02	0.004 6606	38.7	18.31	14.62	20.25	55.17	20 31 54.83
15	135	53 36 8.3	144.56	0.15	0.004 7530	38.3	18.45	14.62	20.24	55.14	20 27 58.92
16	136	54 33 57.1	144.51	+0.28	0.004 8445	+37.9	18.59	+14.62	20.24	55.11	20 24 3.01
17	137	55 31 44.5	144.45	+0.40	0.004 9351	+37.5	18.73	+14.63	20.23	55.09	20 20 7.1[illegible]

FOR GREENWICH MEAN NOON.

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
May 17	137	55 31 44.5	144.45	+0.40	0.004 9351	+37.5	18.73	+14.63	20.23	55.09	20 20 7.10
18	138	56 29 30.7	144.40	0.52	0.005 0248	37.1	18.86	14.64	20.23	55.06	20 16 11.19
19	139	57 27 15.6	144.35	0.63	0.005 1134	36.7	19.00	14.65	20.22	55.03	20 12 15.28
20	140	58 24 59.4	144.30	0.72	0.005 2008	36.2	19.14	14.66	20.22	55.01	20 8 19.37
21	141	59 22 42.1	144.26	0.78	0.005 2870	35.6	19.28	14.67	20.22	54.98	20 4 23.46
22	142	60 20 23.7	144.21	+0.80	0.005 3719	+35.0	19.41	+14.68	20.21	54.96	20 0 27.55
23	143	61 18 4.3	144.17	0.79	0.005 4552	34.4	19.55	14.69	20.21	54.93	19 56 31.64
24	144	62 15 44.0	144.13	0.75	0.005 5369	33.6	19.69	14.71	20.21	54.91	19 52 35.73
25	145	63 13 22.7	144.09	0.68	0.005 6167	32.8	19.83	14.72	20.20	54.88	19 48 39.82
26	146	64 11 0.4	144.05	0.59	0.005 6945	32.0	19.97	14.74	20.20	54.86	19 44 43.91
27	147	65 8 37.2	144.01	+0.47	0.005 7702	+31.1	20.10	+14.76	20.19	54.84	19 40 48.00
28	148	66 6 13.0	143.97	0.34	0.005 8436	30.1	20.24	14.78	20.19	54.81	19 36 52.09
29	149	67 3 47.8	143.92	0.21	0.005 9146	29.1	20.38	14.80	20.19	54.79	19 32 56.18
30	150	68 1 21.4	143.88	+0.07	0.005 9833	28.1	20.52	14.82	20.18	54.77	19 29 0.27
31	151	68 58 53.9	143.83	−0.07	0.006 0495	27.1	20.65	14.84	20.18	54.75	19 25 4.36
June 1	152	69 56 25.2	143.78	−0.18	0.006 1134	+26.2	20.79	+14.87	20.18	54.73	19 21 8.45
2	153	70 53 55.2	143.73	0.26	0.006 1751	25.2	20.93	14.89	20.18	54.71	19 17 12.54
3	154	71 51 24.0	143.68	0.32	0.006 2346	24.4	21.07	14.91	20.17	54.69	19 13 16.62
4	155	72 48 51.6	143.62	0.35	0.006 2921	23.5	21.20	14.94	20.17	54.67	19 9 20.71
5	156	73 46 18.0	143.57	0.35	0.006 3476	22.8	21.34	14.97	20.17	54.65	19 5 24.80
6	157	74 43 43.1	143.52	−0.32	0.006 4014	+22.0	21.48	+14.99	20.16	54.63	19 1 28.89
7	158	75 41 7.1	143.48	0.26	0.006 4534	21.3	21.62	15.02	20.16	54.61	18 57 32.98
8	159	76 38 30.1	143.44	0.18	0.006 5038	20.7	21.75	15.05	20.16	54.59	18 53 37.07
9	160	77 35 52.0	143.39	−0.07	0.006 5526	20.0	21.89	15.08	20.16	54.57	18 49 41.16
10	161	78 33 12.9	143.35	+0.05	0.006 5999	19.4	22.03	15.11	20.16	54.56	18 45 45.25
11	162	79 30 32.9	143.32	+0.17	0.006 6457	+18.8	22.17	+15.14	20.15	54.54	18 41 49.33
12	163	80 27 52.1	143.29	0.30	0.006 6901	18.2	22.30	15.17	20.15	54.53	18 37 53.42
13	164	81 25 10.5	143.25	0.43	0.006 7332	17.6	22.44	15.20	20.15	54.51	18 33 57.51
14	165	82 22 28.2	143.22	0.56	0.006 7748	17.0	22.58	15.23	20.15	54.50	18 30 1.60
15	166	83 19 45.4	143.20	0.67	0.006 8150	16.5	22.72	15.26	20.15	54.48	18 26 5.69
16	167	84 17 2.0	143.18	+0.76	0.006 8538	+15.9	22.85	+15.29	20.14	54.47	18 22 9.78
17	168	85 14 18.2	143.17	0.82	0.006 8912	15.2	22.99	15.32	20.14	54.46	18 18 13.86
18	169	86 11 34.0	143.16	0.85	0.006 9270	14.6	23.13	15.35	20.14	54.45	18 14 17.95
19	170	87 8 49.6	143.14	0.86	0.006 9611	13.9	23.27	15.39	20.14	54.43	18 10 22.04
20	171	88 6 5.0	143.14	0.83	0.006 9935	13.1	23.41	15.42	20.14	54.42	18 6 26.13
21	172	89 3 20.2	143.13	+0.77	0.007 0240	+12.3	23.54	+15.45	20.14	54.41	18 2 30.22
22	173	90 0 35.3	143.13	0.69	0.007 0525	11.4	23.68	15.48	20.13	54.40	17 58 34.31
23	174	90 57 50.3	143.12	0.58	0.007 0788	10.5	23.82	15.52	20.13	54.40	17 54 38.40
24	175	91 55 5.2	143.12	0.45	0.007 1028	9.5	23.96	15.55	20.13	54.39	17 50 42.48
25	176	92 52 20.0	143.11	0.32	0.007 1242	8.4	24.09	15.58	20.13	54.38	17 46 46.57
26	177	93 49 34.7	143.11	+0.18	0.007 1431	+ 7.3	24.23	+15.61	20.13	54.37	17 42 50.66
27	178	94 46 49.2	143.10	+0.04	0.007 1594	6.2	24.37	15.65	20.13	54.37	17 38 54.75
28	179	95 44 3.6	143.09	−0.08	0.007 1729	5.1	24.51	15.68	20.13	54.36	17 34 58.84
29	180	96 41 17.7	143.08	0.17	0.007 1838	4.0	24.64	15.71	20.13	54.36	17 31 2.93
30	181	97 38 31.5	143.07	0.24	0.007 1920	2.9	24.78	15.74	20.13	54.35	17 27 7.02
July 1	182	98 35 45.0	143.06	−0.28	0.007 1977	+ 1.9	24.92	+15.77	20.13	54.35	17 23 11.10
2	183	99 32 58.2	143.04	−0.30	0.007 2009	+ 0.9	25.06	+15.80	20.13	54.34	17 19 15.19

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	′ ″	″	m s	s	h m s
Aug. 16	Sa	9 39 39.12	9.365	+13 59 59.9	−46.95	15 49.65	8.69	− 4 20.02	+0.491	9 35 19.10
17	Su	9 43 23.64	9.345	13 41 6.4	47.50	15 49.82	8.69	4 7.99	0.512	9 39 15.65
18	Mo	9 47 7.67	9.324	13 21 59.8	48.04	15 49.99	8.70	3 55.46	0.532	9 43 12.21
19	Tu	9 50 51.20	9.304	13 2 40.4	48.57	15 50.17	8.70	3 42.44	0.552	9 47 8.76
20	We	9 54 34.26	9.284	12 43 8.5	49.09	15 50.36	8.70	3 28.95	0.572	9 51 5.31
21	Th	9 58 16.85	9.265	+12 23 24.3	−49.59	15 50.54	8.70	− 3 14.99	+0.591	9 55 1.87
22	Fr	10 1 58.99	9.246	12 3 28.3	50.08	15 50.73	8.70	3 0.57	0.610	9 58 58.42
23	Sa	10 5 40.68	9.228	11 43 20.8	50.55	15 50.93	8.70	2 45.70	0.629	10 2 54.97
24	Su	10 9 21.93	9.210	11 23 2.1	51.01	15 51.13	8.71	2 30.40	0.647	10 6 51.53
25	Mo	10 13 2.75	9.192	11 2 32.6	51.45	15 51.33	8.71	2 14.67	0.664	10 10 48.08
26	Tu	10 16 43.15	9.175	+10 41 52.6	−51.88	15 51.54	8.71	− 1 58.52	+0.682	10 14 44.63
27	We	10 20 23.14	9.158	10 21 2.4	52.30	15 51.75	8.71	1 41.96	0.698	10 18 41.19
28	Th	10 24 2.74	9.142	10 0 2.5	52.70	15 51.96	8.71	1 25.00	0.715	10 22 37.74
29	Fr	10 27 41.95	9.126	9 38 53.1	53.09	15 52.18	8.72	1 7.66	0.730	10 26 34.29
30	Sa	10 31 20.79	9.111	9 17 34.5	53.46	15 52.41	8.72	0 49.95	0.745	10 30 30.85
31	Su	10 34 59.28	9.096	+ 8 56 7.1	−53.82	15 52.64	8.72	− 0 31.88	+0.760	10 34 27.40
Sept. 1	Mo	10 38 37.42	9.082	8 34 31.2	54.17	15 52.87	8.72	− 0 13.46	0.774	10 38 23.95
2	Tu	10 42 15.23	9.069	8 12 47.1	54.50	15 53.10	8.72	+ 0 5.28	0.787	10 42 20.51
3	We	10 45 52.73	9.056	7 50 55.2	54.82	15 53.34	8.73	0 24.33	0.800	10 46 17.06
4	Th	10 49 29.94	9.045	7 28 55.8	55.13	15 53.57	8.73	0 43.67	0.812	10 50 13.61
5	Fr	10 53 6.88	9.034	+ 7 6 49.2	−55.42	15 53.81	8.73	+ 1 3.29	+0.823	10 54 10.16
6	Sa	10 56 43.56	9.023	6 44 35.7	55.70	15 54.06	8.73	1 23.16	0.833	10 58 6.72
7	Su	11 0 20.00	9.014	6 22 15.7	55.97	15 54.30	8.73	1 43.27	0.843	11 2 3.27
8	Mo	11 3 56.22	9.005	5 59 49.3	56.23	15 54.54	8.74	2 3.60	0.851	11 5 59.82
9	Tu	11 7 32.25	8.998	5 37 17.0	56.47	15 54.79	8.74	2 24.13	0.859	11 9 56.38
10	We	11 11 8.11	8.991	+ 5 14 39.0	−56.70	15 55.04	8.74	+ 2 44.82	+0.865	11 13 52.93
11	Th	11 14 43.82	8.985	4 51 55.7	56.91	15 55.28	8.74	3 5.66	0.871	11 17 49.48
12	Fr	11 18 19.40	8.980	4 29 7.3	57.12	15 55.53	8.75	3 26.63	0.876	11 21 46.03
13	Sa	11 21 54.88	8.976	4 6 14.1	57.31	15 55.78	8.75	3 47.70	0.880	11 25 42.58
14	Su	11 25 30.28	8.974	3 43 16.5	57.49	15 56.03	8.75	4 8.85	0.883	11 29 39.14
15	Mo	11 29 5.63	8.972	+ 3 20 14.8	−57.65	15 56.28	8.75	+ 4 30.06	+0.885	11 33 35.69
16	Tu	11 32 40.95	8.971	2 57 9.3	57.80	15 56.53	8.75	4 51.30	0.885	11 37 32.24
17	We	11 36 16.25	8.971	2 34 0.3	57.94	15 56.78	8.76	5 12.55	0.886	11 41 28.79
18	Th	11 39 51.55	8.971	2 10 48.2	58.06	15 57.04	8.76	5 33.80	0.885	11 45 25.35
19	Fr	11 43 26.88	8.973	1 47 33.3	58.17	15 57.29	8.76	5 55.02	0.883	11 49 21.90
20	Sa	11 47 2.26	8.975	+ 1 24 16.0	−58.27	15 57.55	8.76	+ 6 16.20	+0.881	11 53 18.45
21	Su	11 50 37.70	8.978	1 0 56.6	58.35	15 57.81	8.77	6 37.31	0.878	11 57 15.00
22	Mo	11 54 13.21	8.982	0 37 35.5	58.41	15 58.08	8.77	6 58.35	0.875	12 1 11.56
23	Tu	11 57 48.82	8.986	+ 0 14 13.1	58.46	15 58.34	8.77	7 19.29	0.870	12 5 8.11
24	We	12 1 24.54	8.991	− 0 9 10.3	58.49	15 58.61	8.77	7 40.12	0.865	12 9 4.66
25	Th	12 5 0.39	8.997	− 0 32 34.4	−58.51	15 58.88	8.78	+ 8 0.82	+0.860	12 13 1.21
26	Fr	12 8 36.38	9.003	0 55 58.7	58.51	15 59.15	8.78	8 21.38	0.854	12 16 57.76
27	Sa	12 12 12.54	9.010	1 19 22.9	58.50	15 59.43	8.78	8 41.78	0.846	12 20 54.32
28	Su	12 15 48.88	9.018	1 42 46.7	58.48	15 59.71	8.78	9 1.99	0.838	12 24 50.87
29	Mo	12 19 25.42	9.027	2 6 9.6	58.43	15 59.99	8.79	9 22.00	0.830	12 28 47.42
30	Tu	12 23 2.18	9.036	− 2 29 31.4	−58.38	16 0.27	8.79	+ 9 41.80	+0.820	12 32 43.97
Oct. 1	We	12 26 39.17	9.046	− 2 52 51.7	−58.31	16 0.55	8.79	+10 1.36	+0.810	12 36 40.53

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
July 1	182	98 35 45.0	143.06	−0.28	0.007 1977	+ 1.9	24.92	+15.77	20.13	54.35	17 23 11.10
2	183	99 32 58.2	143.04	0.30	0.007 2009	+ 0.9	25.06	15.80	20.13	54.34	17 19 15.19
3	184	100 30 11.1	143.03	0.28	0.007 2018	− 0.1	25.19	15.83	20.13	54.34	17 15 19.28
4	185	101 27 23.7	143.02	0.23	0.007 2005	1.0	25.33	15.86	20.13	54.34	17 11 23.37
5	186	102 24 36.0	143.01	0.16	0.007 1970	1.9	25.47	15.89	20.13	54.34	17 7 27.46
6	187	103 21 48.1	143.00	−0.07	0.007 1916	− 2.6	25.61	+15.92	20.13	54.33	17 3 31.55
7	188	104 18 59.9	142.99	+0.04	0.007 1843	3.4	25.74	15.95	20.13	54.33	16 59 35.64
8	189	105 16 11.7	142.99	0.16	0.007 1752	4.1	25.88	15.97	20.13	54.33	16 55 39.73
9	190	106 13 23.3	142.99	0.28	0.007 1644	4.9	26.02	16.00	20.13	54.33	16 51 43.82
10	191	107 10 35.0	142.99	0.40	0.007 1519	5.5	26.16	16.02	20.13	54.34	16 47 47.90
11	192	108 7 46.6	142.99	+0.52	0.007 1378	− 6.2	26.30	+16.05	20.13	54.34	16 43 51.99
12	193	109 4 58.5	143.00	0.64	0.007 1222	6.8	26.43	16.07	20.13	54.34	16 39 56.08
13	194	110 2 10.5	143.01	0.74	0.007 1052	7.4	26.57	16.10	20.13	54.34	16 36 0.17
14	195	110 59 22.8	143.02	0.80	0.007 0867	8.0	26.71	16.12	20.13	54.34	16 32 4.26
15	196	111 56 35.5	143.04	0.84	0.007 0668	8.6	26.85	16.14	20.13	54.35	16 28 8.35
16	197	112 53 48.7	143.06	+0.85	0.007 0454	− 9.2	26.98	+16.16	20.14	54.35	16 24 12.44
17	198	113 51 2.4	143.09	0.83	0.007 0224	9.9	27.12	16.18	20.14	54.35	16 20 16.53
18	199	114 48 16.8	143.11	0.78	0.006 9978	10.6	27.26	16.20	20.14	54.36	16 16 20.62
19	200	115 45 31.9	143.14	0.70	0.006 9715	11.3	27.40	16.21	20.14	54.37	16 12 24.71
20	201	116 42 47.8	143.18	0.60	0.006 9434	12.1	27.53	16.23	20.14	54.37	16 8 28.80
21	202	117 40 4.5	143.21	+0.48	0.006 9133	−13.0	27.67	+16.25	20.14	54.38	16 4 32.89
22	203	118 37 22.0	143.25	0.34	0.006 8810	13.9	27.81	16.26	20.14	54.38	16 0 36.98
23	204	119 34 40.4	143.28	0.20	0.006 8465	14.9	27.95	16.27	20.14	54.39	15 56 41.07
24	205	120 31 59.6	143.32	+0.06	0.006 8097	15.9	28.08	16.28	20.15	54.39	15 52 45.16
25	206	121 29 19.7	143.35	−0.07	0.006 7704	16.9	28.22	16.29	20.15	54.40	15 48 49.25
26	207	122 26 40.5	143.39	−0.17	0.006 7285	−18.0	28.36	+16.30	20.15	54.41	15 44 53.34
27	208	123 24 2.1	143.41	0.25	0.006 6841	19.0	28.50	16.31	20.15	54.41	15 40 57.43
28	209	124 21 24.4	143.44	0.30	0.006 6371	20.1	28.63	16.32	20.16	54.42	15 37 1.52
29	210	125 18 47.3	143.47	0.32	0.006 5877	21.1	28.77	16.32	20.16	54.43	15 33 5.61
30	211	126 16 10.9	143.49	0.30	0.006 5358	22.1	28.91	16.33	20.16	54.44	15 29 9.70
31	212	127 13 35.1	143.52	−0.26	0.006 4816	−23.0	29.05	+16.33	20.16	54.45	15 25 13.79
Aug. 1	213	128 10 59.9	143.55	0.19	0.006 4253	23.9	29.18	16.33	20.16	54.46	15 21 17.88
2	214	129 8 25.4	143.57	−0.10	0.006 3668	24.8	29.32	16.33	20.17	54.47	15 17 21.97
3	215	130 5 51.5	143.60	0.00	0.006 3064	25.5	29.46	16.33	20.17	54.48	15 13 26.06
4	216	131 3 18.2	143.63	+0.11	0.006 2442	26.3	29.60	16.33	20.17	54.49	15 9 30.15
5	217	132 0 45.7	143.66	+0.22	0.006 1803	−27.0	29.74	+16.33	20.18	54.50	15 5 34.24
6	218	132 58 13.9	143.69	0.34	0.006 1147	27.6	29.87	16.32	20.18	54.50	15 1 38.33
7	219	133 55 42.9	143.72	0.46	0.006 0476	28.2	30.01	16.31	20.18	54.51	14 57 42.42
8	220	134 53 12.8	143.76	0.56	0.005 9791	28.8	30.15	16.30	20.19	54.52	14 53 46.51
9	221	135 50 43.5	143.80	0.65	0.005 9093	29.3	30.29	16.29	20.19	54.53	14 49 50.60
10	222	136 48 15.2	143.84	+0.72	0.005 8383	−29.8	30.42	+16.28	20.19	54.54	14 45 54.70
11	223	137 45 48.0	143.89	0.76	0.005 7662	30.3	30.56	16.27	20.19	54.55	14 41 58.79
12	224	138 43 21.8	143.94	0.77	0.005 6930	30.7	30.70	16.26	20.20	54.56	14 38 2.88
13	225	139 40 57.0	143.99	0.75	0.005 6187	31.2	30.84	16.24	20.20	54.57	14 34 6.97
14	226	140 38 33.4	144.05	0.71	0.005 5434	31.6	30.97	16.23	20.20	54.58	14 30 11.06
15	227	141 36 11.3	144.11	+0.64	0.005 4670	−32.1	31.11	+16.21	20.21	54.59	14 26 15.15
16	228	142 33 50.6	144.17	+0.53	0.005 3894	−32.6	31.25	+16.19	20.21	54.60	14 22 19.24

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
Aug. 16	228	142 33 50.6	144.17	+0.53	0.005 3894	−32.6	31.25	+16.19	20.21	54.60	14 22 19.24
17	229	143 31 31.5	144.24	0.41	0.005 3106	33.2	31.39	16.17	20.22	54.61	14 18 23.34
18	230	144 29 14.0	144.30	0.27	0.005 2303	33.8	31.52	16.15	20.22	54.62	14 14 27.43
19	231	145 26 58.2	144.38	+0.13	0.005 1485	34.4	31.66	16.12	20.22	54.62	14 10 31.52
20	232	146 24 44.0	144.45	0.00	0.005 0651	35.1	31.80	16.10	20.23	54.63	14 6 35.61
21	233	147 22 31.5	144.51	−0.13	0.004 9800	−35.9	31.94	+16.07	20.23	54.64	14 2 39.70
22	234	148 20 20.7	144.58	0.23	0.004 8930	36.6	32.07	16.04	20.23	54.65	13 58 43.80
23	235	149 18 11.5	144.65	0.30	0.004 8041	37.4	32.21	16.02	20.24	54.66	13 54 47.89
24	236	150 16 3.8	144.71	0.35	0.004 7133	38.3	32.35	15.99	20.24	54.67	13 50 51.98
25	237	151 13 57.8	144.78	0.38	0.004 6204	39.1	32.49	15.95	20.25	54.67	13 46 56.07
26	238	152 11 53.2	144.84	−0.37	0.004 5255	−39.9	32.63	+15.92	20.25	54.68	13 43 0.17
27	239	153 9 50.2	144.90	0.33	0.004 4287	40.7	32.76	15.89	20.26	54.68	13 39 4.26
28	240	154 7 48.5	144.96	0.26	0.004 3301	41.5	32.90	15.85	20.26	54.69	13 35 8.35
29	241	155 5 48.3	145.02	0.18	0.004 2297	42.2	33.04	15.82	20.27	54.70	13 31 12.44
30	242	156 3 49.5	145.08	−0.08	0.004 1276	42.8	33.18	15.78	20.27	54.70	13 27 16.54
31	243	157 1 52.0	145.14	+0.03	0.004 0241	−43.4	33.31	+15.74	20.28	54.71	13 23 20.63
Sept. 1	244	157 59 56.0	145.19	0.15	0.003 9191	44.0	33.45	15.70	20.28	54.71	13 19 24.72
2	245	158 58 1.3	145.25	0.27	0.003 8128	44.5	33.59	15.66	20.29	54.72	13 15 28.82
3	246	159 56 8.1	145.31	0.38	0.003 7053	45.0	33.73	15.62	20.29	54.72	13 11 32.91
4	247	160 54 16.3	145.37	0.49	0.003 5968	45.4	33.86	15.58	20.30	54.72	13 7 37.00
5	248	161 52 25.9	145.43	+0.58	0.003 4874	−45.7	34.00	+15.54	20.30	54.73	13 3 41.10
6	249	162 50 37.1	145.50	0.65	0.003 3772	46.0	34.14	15.49	20.31	54.73	12 59 45.19
7	250	163 48 49.8	145.56	0.70	0.003 2664	46.3	34.28	15.45	20.31	54.73	12 55 49.28
8	251	164 47 4.0	145.63	0.72	0.003 1551	46.5	34.41	15.40	20.32	54.73	12 51 53.38
9	252	165 45 20.0	145.70	0.70	0.003 0433	46.6	34.55	15.36	20.32	54.73	12 47 57.47
10	253	166 43 37.7	145.78	+0.65	0.002 9312	−46.7	34.69	+15.31	20.33	54.73	12 44 1.56
11	254	167 41 57.2	145.85	0.58	0.002 8189	46.8	34.83	15.26	20.33	54.73	12 40 5.66
12	255	168 40 18.7	145.94	0.49	0.002 7064	47.0	34.96	15.21	20.34	54.73	12 36 9.75
13	256	169 38 42.1	146.02	0.37	0.002 5935	47.1	35.10	15.16	20.34	54.73	12 32 13.84
14	257	170 37 7.7	146.11	0.24	0.002 4802	47.3	35.24	15.11	20.35	54.73	12 28 17.94
15	258	171 35 35.4	146.20	+0.10	0.002 3666	−47.5	35.38	+15.06	20.35	54.73	12 24 22.03
16	259	172 34 5.2	146.29	−0.03	0.002 2523	47.7	35.51	15.01	20.36	54.72	12 20 26.12
17	260	173 32 37.3	146.38	0.15	0.002 1374	48.0	35.65	14.96	20.36	54.72	12 16 30.22
18	261	174 31 11.6	146.48	0.26	0.002 0218	48.4	35.79	14.91	20.37	54.71	12 12 34.31
19	262	175 29 48.2	146.57	0.34	0.001 9052	48.8	35.93	14.86	20.37	54.71	12 8 38.40
20	263	176 28 26.9	146.66	−0.39	0.001 7877	−49.2	36.07	+14.81	20.38	54.70	12 4 42.50
21	264	177 27 7.7	146.75	0.41	0.001 6692	49.6	36.20	14.76	20.39	54.70	12 0 46.59
22	265	178 25 50.7	146.83	0.41	0.001 5495	50.1	36.34	14.70	20.39	54.69	11 56 50.68
23	266	179 24 35.7	146.92	0.38	0.001 4288	50.5	36.48	14.65	20.40	54.68	11 52 54.78
24	267	180 23 22.8	147.00	0.31	0.001 3071	51.0	36.62	14.60	20.40	54.67	11 48 58.87
25	268	181 22 11.8	147.08	−0.22	0.001 1843	−51.4	36.75	+14.55	20.41	54.66	11 45 2.96
26	269	182 21 2.7	147.16	−0.12	0.001 0606	51.7	36.89	14.49	20.41	54.65	11 41 7.06
27	270	183 19 55.5	147.24	0.00	0.000 9360	52.1	37.03	14.44	20.42	54.64	11 37 11.15
28	271	184 18 50.2	147.31	+0.13	0.000 8105	52.4	37.17	14.39	20.43	54.63	11 33 15.25
29	272	185 17 46.6	147.39	0.26	0.000 6845	52.6	37.30	14.34	20.43	54.62	11 29 19.34
30	273	186 16 44.9	147.46	+0.38	0.000 5580	−52.8	37.44	+14.29	20.44	54.61	11 25 23.44
Oct. 1	274	187 15 45.0	147.54	+0.49	0.000 4309	−53.0	37.58	+14.23	20.44	54.60	11 21 27.53

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	′ ″	″	m s	s	h m s
Oct. 1	We	12 26 39.17	9.046	− 2 52 51.7	−58.31	16 0.55	8.79	+10 1.36	+0.810	12 36 40.53
2	Th	12 30 16.42	9.058	3 16 10.2	58.23	16 0.83	8.79	10 20.66	0.798	12 40 37.08
3	Fr	12 33 53.95	9.070	3 39 26.4	58.12	16 1.11	8.80	10 39.68	0.787	12 44 33.63
4	Sa	12 37 31.77	9.082	4 2 40.0	58.01	16 1.39	8.80	10 58.41	0.774	12 48 30.18
5	Su	12 41 9.91	9.096	4 25 50.7	57.88	16 1.68	8.80	11 16.82	0.760	12 52 26.73
6	Mo	12 44 48.39	9.111	− 4 48 58.1	−57.74	16 1.96	8.80	+11 34.90	+0.746	12 56 23.29
7	Tu	12 48 27.23	9.126	5 12 1.9	57.58	16 2.24	8.81	11 52.61	0.730	13 0 19.84
8	We	12 52 6.45	9.143	5 35 1.8	57.41	16 2.51	8.81	12 9.94	0.714	13 4 16.39
9	Th	12 55 46.08	9.160	5 57 57.3	57.22	16 2.79	8.81	12 26.87	0.696	13 8 12.94
10	Fr	12 59 26.14	9.179	6 20 48.2	57.02	16 3.07	8.81	12 43.36	0.678	13 12 9.50
11	Sa	13 3 6.66	9.198	− 6 43 34.1	−56.80	16 3.34	8.82	+12 59.40	+0.658	13 16 6.05
12	Su	13 6 47.65	9.218	7 6 14.7	56.58	16 3.62	8.82	13 14.95	0.638	13 20 2.60
13	Mo	13 10 29.15	9.240	7 28 49.6	56.33	16 3.89	8.82	13 30.00	0.616	13 23 59.16
14	Tu	13 14 11.18	9.262	7 51 18.5	56.07	16 4.16	8.82	13 44.53	0.594	13 27 55.71
15	We	13 17 53.75	9.285	8 13 40.9	55.79	16 4.42	8.83	13 58.51	0.571	13 31 52.26
16	Th	13 21 36.88	9.309	− 8 35 56.5	−55.50	16 4.69	8.83	+14 11.93	+0.547	13 35 48.81
17	Fr	13 25 20.60	9.334	8 58 4.8	55.19	16 4.96	8.83	14 24.76	0.522	13 39 45.37
18	Sa	13 29 4.92	9,359	9 20 5.6	54.87	16 5.23	8.83	14 37.00	0.497	13 43 41.92
19	Su	13 32 49.85	9.385	9 41 58.4	54.53	16 5.49	8.84	14 48.62	0.471	13 47 38.47
20	Mo	13 36 35.42	9.412	10 3 42.7	54.17	16 5.76	8.84	14 59.61	0.444	13 51 35.03
21	Tu	13 40 21.63	9.439	−10 25 18.3	−53.80	16 6.03	8.84	+15 9.95	+0.417	13 55 31.58
22	We	13 44 8.49	9.467	10 46 44.7	53.40	16 6.29	8.84	15 19.64	0.390	13 59 28.13
23	Th	13 47 56.03	9.495	11 8 1.4	52.99	16 6.56	8.85	15 28.66	0.362	14 3 24.69
24	Fr	13 51 44.24	9.523	11 29 8.0	52.56	16 6.82	8.85	15 37.00	0.333	14 7 21.24
25	Sa	13 55 33.14	9.552	11 50 4.3	52.12	16 7.09	8.85	15 44.65	0.304	14 11 17.79
26	Su	13 59 22.75	9.582	−12 10 49.6	−51.66	16 7.36	8.85	+15 51.60	+0.275	14 15 14.35
27	Mo	14 3 13.07	9.612	12 31 23.7	51.18	16 7.62	8.86	15 57.83	0.245	14 19 10.90
28	Tu	14 7 4.11	9.642	12 51 46.2	50.69	16 7.89	8.86	16 3.34	0.214	14 23 7.45
29	We	14 10 55.89	9.673	13 11 56.5	50.17	16 8.15	8.86	16 8.11	0.183	14 27 4.01
30	Th	14 14 48.42	9.704	13 31 54.4	49.65	16 8.41	8.86	16 12.14	0.152	14 31 0.56
31	Fr	14 18 41.69	9.736	−13 51 39.4	−49.10	16 8.67	8.87	+16 15.42	+0.121	14 34 57.12
Nov. 1	Sa	14 22 35.73	9.768	14 11 11.1	48.54	16 8.93	8.87	16 17.94	0.089	14 38 53.67
2	Su	14 26 30.54	9.800	14 30 29.0	47.96	16 9.19	8.87	16 19.68	0.056	14 42 50.22
3	Mo	14 30 26.14	9.833	14 49 32.9	47.36	16 9.45	8.87	16 20.64	+0.024	14 46 46.78
4	Tu	14 34 22.52	9.866	15 8 22.3	46.75	16 9.69	8.88	16 20.81	−0.010	14 50 43.33
5	We	14 38 19.70	9.900	−15 26 56.8	−46.12	16 9.94	8.88	+16 20.18	−0.043	14 54 39.89
6	Th	14 42 17.70	9.934	15 45 15.9	45.47	16 10.19	8.88	16 18.74	0.077	14 58 36.44
7	Fr	14 46 16.52	9.968	16 3 19.4	44.82	16 10.43	8.88	16 16.48	0.112	15 2 33.00
8	Sa	14 50 16.17	10.003	16 21 6.9	44.14	16 10.66	8.88	16 13.38	0.147	15 6 29.55
9	Su	14 54 16.66	10.038	16 38 37.9	43.44	16 10.90	8.89	16 9.44	0.182	15 10 26.11
10	Mo	14 58 18.01	10.074	−16 55 52.0	−42.73	16 11.13	8.89	+16 4.66	−0.217	15 14 22.66
11	Tu	15 2 20.21	10.110	17 12 48.9	42.00	16 11.35	8.89	15 59.01	0.254	15 18 19.22
12	We	15 6 23.28	10.146	17 29 28.1	41.26	16 11.57	8.89	15 52.49	0.290	15 22 15.77
13	Th	15 10 27.22	10.182	17 45 49.4	40.51	16 11.79	8.89	15 45.11	0.326	15 26 12.33
14	Fr	15 14 32.03	10.219	18 1 52.2	39.73	16 12.00	8.90	15 36.86	0.362	15 30 8.88
15	Sa	15 18 37.71	10.255	−18 17 36.1	−38.93	16 12.21	8.90	+15 27.73	−0.398	15 34 5.44
16	*Su*	*15 22 44.25*	*10.291*	*−18 33 0.9*	−38.13	16 12.42	8.90	+15 17.74	−0.434	15 38 1.99

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
Oct. 1	274	187 15 45.0	147.54	+0.49	0.000 4309	−53.0	37.58	+14.23	20.44	54.60	11 21 27.53
2	275	188 14 46.8	147.61	0.59	0.000 3036	53.1	37.72	14.18	20.45	54.58	11 17 31.62
3	276	189 13 50.4	147.69	0.67	0.000 1762	53.1	37.85	14.13	20.46	54.57	11 13 35.72
4	277	190 12 55.8	147.76	0.72	0.000 0487	53.1	37.99	14.08	20.46	54.56	11 9 39.81
5	278	191 12 2.9	147.84	0.75	9.999 9213	53.0	38.13	14.03	20.47	54.54	11 5 43.90
6	279	192 11 11.9	147.91	+0.74	9.999 7943	−52.8	38.27	+13.98	20.47	54.52	11 1 48.00
7	280	193 10 22.6	147.98	0.71	9.999 6677	52.6	38.40	13.93	20.48	54.51	10 57 52.09
8	281	194 9 35.3	148.07	0.65	9.999 5417	52.4	38.54	13.88	20.49	54.49	10 53 56.18
9	282	195 8 50.0	148.15	0.56	9.999 4164	52.0	38.68	13.84	20.49	54.47	10 50 0.28
10	283	196 8 6.7	148.24	0.44	9.999 2919	51.7	38.82	13.79	20.50	54.45	10 46 4.37
11	284	197 7 25.5	148.33	+0.31	9.999 1682	−51.4	38.96	+13.75	20.50	54.43	10 42 8.46
12	285	198 6 46.5	148.42	0.17	9.999 0453	51.1	39.09	13.70	20.51	54.41	10 38 12.56
13	286	199 6 9.7	148.52	+0.03	9.998 9231	50.8	39.23	13.66	20.52	54.39	10 34 16.65
14	287	200 5 35.3	148.61	−0.10	9.998 8015	50.5	39.37	13.62	20.52	54.37	10 30 20.74
15	288	201 5 3.2	148.71	0.21	9.998 6805	50.3	39.51	13.57	20.53	54.35	10 26 24.84
16	289	202 4 33.4	148.81	−0.30	9.998 5599	−50.2	39.64	+13.53	20.53	54.33	10 22 28.93
17	290	203 4 6.0	148.91	0.36	9.998 4396	50.1	39.78	13.49	20.54	54.31	10 18 33.02
18	291	204 3 40.9	149.00	0.39	9.998 3195	50.0	39.92	13.45	20.54	54.29	10 14 37.12
19	292	205 3 18.1	149.09	0.38	9.998 1996	50.0	40.06	13.42	20.55	54.26	10 10 41.21
20	293	206 2 57.5	149.19	0.34	9.998 0797	49.9	40.19	13.38	20.55	54.24	10 6 45.30
21	294	207 2 39.1	149.28	−0.28	9.997 9599	−49.9	40.33	+13.35	20.56	54.22	10 2 49.39
22	295	208 2 22.8	149.36	0.20	9.997 8402	49.9	40.47	13.31	20.57	54.19	9 58 53.49
23	296	209 2 8.5	149.45	−0.09	9.997 7205	49.9	40.61	13.28	20.57	54.17	9 54 57.58
24	297	210 1 56.3	149.53	+0.03	9.997 6008	49.8	40.74	13.25	20.58	54.14	9 51 1.67
25	298	211 1 46.0	149.61	0.16	9.997 4813	49.8	40.88	13.22	20.58	54.12	9 47 5.76
26	299	212 1 37.6	149.69	+0.29	9.997 3619	−49.7	41.02	+13.19	20.59	54.09	9 43 9.86
27	300	213 1 31.0	149.76	0.42	9.997 2428	49.5	41.16	13.16	20.59	54.06	9 39 13.95
28	301	214 1 26.2	149.83	0.54	9.997 1241	49.4	41.29	13.14	20.60	54.04	9 35 18.04
29	302	215 1 23.1	149.91	0.65	9.997 0059	49.1	41.43	13.11	20.61	54.01	9 31 22.13
30	303	216 1 21.7	149.98	0.73	9.996 8882	48.9	41.57	13.09	20.61	53.98	9 27 26.22
31	304	217 1 21.9	150.04	+0.79	9.996 7712	−48.6	41.71	+13.07	20.62	53.96	9 23 30.32
Nov. 1	305	218 1 23.8	150.11	0.82	9.996 6550	48.2	41.84	13.05	20.62	53.93	9 19 34.41
2	306	219 1 27.2	150.18	0.82	9.996 5399	47.7	41.98	13.03	20.63	53.90	9 15 38.50
3	307	220 1 32.2	150.24	0.79	9.996 4258	47.2	42.12	13.01	20.63	53.88	9 11 42.59
4	308	221 1 38.8	150.31	0.73	9.996 3131	46.6	42.26	13.00	20.64	53.85	9 7 46.68
5	309	222 1 47.0	150.37	+0.64	9.996 2019	−46.0	42.40	+12.98	20.64	53.82	9 3 50.77
6	310	223 1 56.8	150.44	0.53	9.996 0924	45.3	42.53	12.97	20.65	53.79	8 59 54.86
7	311	224 2 8.3	150.51	0.41	9.995 9846	44.5	42.67	12.96	20.65	53.76	8 55 58.96
8	312	225 2 21.6	150.59	0.27	9.995 8786	43.7	42.81	12.95	20.66	53.74	8 52 3.05
9	313	226 2 36.6	150.66	+0.13	9.995 7746	43.0	42.95	12.95	20.66	53.71	8 48 7.14
10	314	227 2 53.5	150.74	−0.01	9.995 6724	−42.2	43.08	+12.94	20.67	53.68	8 44 11.23
11	315	228 3 12.2	150.82	0.14	9.995 5720	41.5	43.22	12.94	20.67	53.65	8 40 15.32
12	316	229 3 33.0	150.90	0.24	9.995 4734	40.7	43.36	12.93	20.68	53.62	8 36 19.41
13	317	230 3 55.6	150.99	0.31	9.995 3764	40.1	43.50	12.93	20.68	53.59	8 32 23.50
14	318	231 4 20.3	151.07	0.35	9.995 2809	39.5	43.63	12.93	20.69	53.57	8 28 27.59
15	319	232 4 46.9	151.15	−0.36	9.995 1869	−38.9	43.77	+12.94	20.69	53.54	8 24 31.68
16	320	233 5 15.4	151.22	−0.34	9.995 0941	−38.4	43.91	+12.94	20.70	53.51	8 20 35.77

FOR GREENWICH MEAN NOON.

Date.	Day of the Week.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Semi-diameter.	Hor. Par.	Equation of Time. App.—Mean.	Var. per Hour.	Sidereal Time, or Right Ascension of Mean Sun.
		h m s	s	° ′ ″	″	′ ″	″	m s	s	h m s
Nov. 16	Su	15 22 44.25	10.291	−18 33 0.9	−38.13	16 12.42	8.90	+15 17.74	−0.434	15 38 1.99
17	Mo	15 26 51.66	10.327	18 48 6.0	37.30	16 12.62	8.90	15 6.89	0.470	15 41 58.55
18	Tu	15 30 59.92	10.362	19 2 51.1	36.45	16 12.83	8.90	14 55.18	0.505	15 45 55.11
19	We	15 35 9.03	10.397	19 17 15.7	35.60	16 13.03	8.91	14 42.63	0.540	15 49 51.66
20	Th	15 39 18.98	10.432	19 31 19.6	34.72	16 13.22	8.91	14 29.24	0.575	15 53 48.22
21	Fr	15 43 29.75	10.466	−19 45 2.3	−33.83	16 13.42	8.91	+14 15.02	−0.609	15 57 44.77
22	Sa	15 47 41.34	10.500	19 58 23.4	32.93	16 13.61	8.91	13 59.99	0.643	16 1 41.33
23	Su	15 51 53.73	10.533	20 11 22.6	32.00	16 13.80	8.91	13 44.16	0.676	16 5 37.89
24	Mo	15 56 6.91	10.565	20 23 59.5	31.07	16 13.99	8.91	13 27.54	0.709	16 9 34.44
25	Tu	16 0 20.85	10.597	20 36 13.8	30.12	16 14.18	8.92	13 10.15	0.741	16 13 31.00
26	We	16 4 35.56	10.628	−20 48 5.1	−29.15	16 14.36	8.92	+12 52.00	−0.772	16 17 27.55
27	Th	16 8 51.00	10.658	20 59 33.1	28.18	16 14.54	8.92	12 33.11	0.802	16 21 24.11
28	Fr	16 13 7.16	10.688	21 10 37.5	27.19	16 14.71	8.92	12 13.51	0.831	16 25 20.67
29	Sa	16 17 24.02	10.717	21 21 17.9	26.18	16 14.89	8.92	11 53.21	0.860	16 29 17.22
30	Su	16 21 41.55	10.744	21 31 34.0	25.16	16 15.06	8.92	11 32.23	0.888	16 33 13.78
Dec. 1	Mo	16 25 59.75	10.772	−21 41 25.5	−24.13	16 15.22	8.93	+11 10.58	−0.915	16 37 10.34
2	Tu	16 30 18.59	10.798	21 50 52.1	23.09	16 15.39	8.93	10 48.30	0.941	16 41 6.90
3	We	16 34 38.05	10.823	21 59 53.6	22.04	16 15.55	8.93	10 25.41	0.967	16 45 3.45
4	Th	16 38 58.10	10.848	22 8 29.7	20.97	16 15.70	8.93	10 1.91	0.991	16 49 0.01
5	Fr	16 43 18.73	10.871	22 16 40.1	19.90	16 15.84	8.93	9 37.83	1.015	16 52 56.57
6	Sa	16 47 39.92	10.894	−22 24 24.6	−18.81	16 15.98	8.93	+ 9 13.20	−1.038	16 56 53.12
7	Su	16 52 1.65	10.916	22 31 42.9	17.71	16 16.12	8.93	8 48.03	1.060	17 0 49.68
8	Mo	16 56 23.90	10.938	22 38 34.8	16.61	16 16.25	8.93	8 22.33	1.081	17 4 46.24
9	Tu	17 0 46.65	10.958	22 45 0.1	15.50	16 16.37	8.94	7 56.14	1.101	17 8 42.79
10	We	17 5 9.87	10.977	22 50 58.6	14.37	16 16.48	8.94	7 29.48	1.121	17 12 39.35
11	Th	17 9 33.55	10.995	−22 56 30.0	−13.24	16 16.59	8.94	+ 7 2.36	−1.139	17 16 35.91
12	Fr	17 13 57.64	11.012	23 1 34.3	12.11	16 16.70	8.94	6 34.82	1.156	17 20 32.47
13	Sa	17 18 22.13	11.028	23 6 11.2	10.97	16 16.80	8.94	6 6.89	1.172	17 24 29.02
14	Su	17 22 46.99	11.043	23 10 20.6	9.81	16 16.89	8.94	5 38.59	1.187	17 28 25.58
15	Mo	17 27 12.19	11.056	23 14 2.2	8.66	16 16.98	8.94	5 9.95	1.200	17 32 22.14
16	Tu	17 31 37.68	11.068	−23 17 16.1	− 7.50	16 17.07	8.94	+ 4 41.02	−1.211	17 36 18.70
17	We	17 36 3.44	11.078	23 20 2.1	6.33	16 17.15	8.94	4 11.82	1.222	17 40 15.26
18	Th	17 40 29.43	11.087	23 22 20.0	5.16	16 17.22	8.94	3 42.39	1.231	17 44 11.81
19	Fr	17 44 55.61	11.094	23 24 9.8	3.99	16 17.30	8.95	3 12.76	1.238	17 48 8.37
20	Sa	17 49 21.95	11.100	23 25 31.5	2.82	16 17.37	8.95	2 42.98	1.244	17 52 4.93
21	Su	17 53 48.41	11.104	−23 26 25.0	− 1.64	16 17.43	8.95	+ 2 13.08	−1.248	17 56 1.49
22	Mo	17 58 14.95	11.107	23 26 50.1	− 0.46	16 17.49	8.95	1 43.09	1.251	17 59 58.04
23	Tu	18 2 41.54	11.108	23 26 47.0	+ 0.72	16 17.55	8.95	1 13.06	1.251	18 3 54.60
24	We	18 7 8.13	11.108	23 26 15.6	1.90	16 17.61	8.95	0 43.03	1.251	18 7 51.16
25	Th	18 11 34.70	11.106	23 25 16.0	3.07	16 17.66	8.95	+ 0 13.02	1.249	18 11 47.72
26	Fr	18 16 1.19	11.102	−23 23 48.1	+ 4.25	16 17.70	8.95	− 0 16.92	−1.245	18 15 44.28
27	Sa	18 20 27.58	11.097	23 21 52.0	5.42	16 17.74	8.95	0 46.74	1.240	18 19 40.83
28	Su	18 24 53.82	11.090	23 19 27.8	6.59	16 17.78	8.95	1 16.43	1.234	18 23 37.39
29	Mo	18 29 19.89	11.082	23 16 35.5	7.76	16 17.82	8.95	1 45.94	1.225	18 27 33.95
30	Tu	18 33 45.74	11.072	23 13 15.3	8.92	16 17.85	8.95	2 15.23	1.215	18 31 30.51
31	We	18 38 11.34	11.061	−23 9 27.2	+10.08	16 17.87	8.95	− 2 44.27	−1.204	18 35 27.06
32	Th	18 42 36.66	11.049	−23 5 11.3	+11.24	16 17.89	8.95	− 3 13.03	−1.192	18 39 23.62

FOR GREENWICH MEAN NOON.

Date.	Day of the Year.	True Longitude.	Var. per Hour.	Latitude.	Logarithm of the Radius Vector of the Earth.	Var. per Hour.	Prec. in Long.	Nut. in Long.	Aberration.	True Obliquity.	Mean Time of Sidereal Noon.
		° ′ ″	″	″			″	″	″	23° 26′ ″	h m s
Nov. 16	320	233 5 15.4	151.22	−0.34	9.995 0941	−38.4	43.91	+12.94	20.70	53.51	8 20 35.77
17	321	234 5 45.7	151.30	0.29	9.995 0026	37.9	44.05	12.95	20.70	53.48	8 16 39.86
18	322	235 6 17.8	151.37	0.21	9.994 9123	37.4	44.18	12.95	20.71	53.46	8 12 43.95
19	323	236 6 51.7	151.44	−0.11	9.994 8230	37.0	44.32	12.96	20.71	53.43	8 8 48.04
20	324	237 7 27.2	151.51	0.00	9.994 7349	36.5	44.46	12.97	20.71	53.40	8 4 52.13
21	325	238 8 4.3	151.58	+0.12	9.994 6478	−36.1	44.60	+12.98	20.72	53.38	8 0 56.22
22	326	239 8 42.9	151.64	0.25	9.994 5618	35.6	44.73	13.00	20.72	53.35	7 57 0.31
23	327	240 9 23.0	151.70	0.38	9.994 4768	35.2	44.87	13.01	20.73	53.32	7 53 4.40
24	328	241 10 4.4	151.75	0.50	9.994 3930	34.7	45.01	13.03	20.73	53.30	7 49 8.49
25	329	242 10 47.1	151.80	0.60	9.994 3104	34.2	45.15	13.05	20.73	53.27	7 45 12.58
26	330	243 11 31.1	151.85	+0.69	9.994 2290	−33.6	45.29	+13.07	20.74	53.25	7 41 16.67
27	331	244 12 16.1	151.90	0.76	9.994 1490	33.0	45.42	13.09	20.74	53.22	7 37 20.76
28	332	245 13 2.3	151.94	0.79	9.994 0704	32.4	45.56	13.11	20.75	53.20	7 33 24.85
29	333	246 13 49.5	151.99	0.80	9.993 9933	31.8	45.70	13.13	20.75	53.18	7 29 28.94
30	334	247 14 37.6	152.02	0.78	9.993 9179	31.0	45.84	13.15	20.75	53.16	7 25 33.03
Dec. 1	335	248 15 26.7	152.06	+0.73	9.993 8443	−30.3	45.97	+13.18	20.76	53.13	7 21 37.12
2	336	249 16 16.6	152.10	0.65	9.993 7726	29.4	46.11	13.21	20.76	53.11	7 17 41.20
3	337	250 17 7.4	152.13	0.55	9.993 7031	28.5	46.25	13.23	20.76	53.09	7 13 45.29
4	338	251 17 59.0	152.17	0.42	9.993 6359	27.5	46.39	13.26	20.77	53.07	7 9 49.38
5	339	252 18 51.5	152.21	0.28	9.993 5711	26.5	46.52	13.29	20.77	53.05	7 5 53.47
6	340	253 19 44.9	152.24	+0.13	9.993 5089	−25.4	46.66	+13.32	20.77	53.03	7 1 57.56
7	341	254 20 39.3	152.28	−0.01	9.993 4494	24.3	46.80	13.35	20.78	53.01	6 58 1.65
8	342	255 21 34.6	152.33	0.14	9.993 3925	23.1	46.94	13.38	20.78	52.99	6 54 5.74
9	343	256 22 30.9	152.37	0.25	9.993 3384	22.0	47.07	13.42	20.78	52.97	6 50 9.83
10	344	257 23 28.4	152.41	0.33	9.993 2869	20.9	47.21	13.45	20.78	52.96	6 46 13.91
11	345	258 24 26.9	152.46	−0.39	9.993 2379	−19.9	47.35	+13.49	20.79	52.94	6 42 18.00
12	346	259 25 26.5	152.51	0.41	9.993 1913	18.9	47.49	13.52	20.79	52.92	6 38 22.09
13	347	260 26 27.3	152.55	0.40	9.993 1471	18.0	47.62	13.56	20.79	52.91	6 34 26.18
14	348	261 27 29.1	152.60	0.36	9.993 1051	17.1	47.76	13.59	20.79	52.89	6 30 30.27
15	349	262 28 31.9	152.64	0.30	9.993 0651	16.2	47.90	13.63	20.79	52.88	6 26 34.36
16	350	263 29 35.7	152.68	−0.21	9.993 0271	−15.4	48.04	+13.67	20.80	52.86	6 22 38.44
17	351	264 30 40.4	152.71	−0.10	9.992 9910	14.7	48.18	13.70	20.80	52.85	6 18 42.53
18	352	265 31 46.0	152.75	+0.02	9.992 9567	13.9	48.31	13.74	20.80	52.84	6 14 46.62
19	353	266 32 52.3	152.78	0.14	9.992 9242	13.2	48.45	13.78	20.80	52.83	6 10 50.71
20	354	267 33 59.4	152.81	0.26	9.992 8935	12.5	48.59	13.82	20.80	52.82	6 6 54.80
21	355	268 35 7.0	152.83	+0.38	9.992 8644	−11.8	48.73	+13.86	20.80	52.81	6 2 58.88
22	356	269 36 15.2	152.85	0.49	9.992 8370	11.1	48.86	13.90	20.80	52.80	5 59 2.97
23	357	270 37 23.8	152.87	0.58	9.992 8112	10.4	49.00	13.94	20.81	52.79	5 55 7.06
24	358	271 38 32.8	152.88	0.66	9.992 7872	9.7	49.14	13.97	20.81	52.79	5 51 11.15
25	359	272 39 42.1	152.89	0.71	9.992 7648	9.0	49.28	14.01	20.81	52.78	5 47 15.24
26	360	273 40 51.5	152.89	+0.73	9.992 7442	− 8.2	49.41	+14.05	20.81	52.77	5 43 19.33
27	361	274 42 1.0	152.90	0.71	9.992 7255	7.4	49.55	14.09	20.81	52.77	5 39 23.41
28	362	275 43 10.6	152.90	0.67	9.992 7087	6.6	49.69	14.13	20.81	52.76	5 35 27.50
29	363	276 44 20.1	152.89	0.60	9.992 6939	5.7	49.83	14.17	20.81	52.76	5 31 31.59
30	364	277 45 29.5	152.89	0.49	9.992 6812	4.8	49.96	14.20	20.81	52.76	5 27 35.68
31	365	278 46 38.7	152.88	+0.37	9.992 6709	− 3.8	50.10	+14.24	20.81	52.75	5 23 39.77
32	366	279 47 47.8	152.87	+0.23	9.992 6630	− 2.9	50.24	+14.28	20.81	52.75	5 19 43.86

GREENWICH MEAN TIME.

Date.	X True Equinox. Noon.	X True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Y True Equinox. Noon.	Y True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Z True Equinox. Noon.	Z True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.
Jan. 1	+0.171 4378	+0.180 0464	−795	−0.888 2902	−0.886 8528	− 66	−0.385 2973	−0.384 6735	−201
2	0.188 6410	0.197 2207	801	0.885 3461	0.883 7702	81	0.384 0196	0.383 3358	206
3	0.205 7850	0.214 3331	806	0.882 1251	0.880 4109	96	0.382 6220	0.381 8782	212
4	0.222 8644	0.231 3780	811	0.878 6279	0.876 7763	111	0.381 1046	0.380 3013	218
5	0.239 8732	0.248 3494	816	0.874 8562	0.872 8677	127	0.379 4683	0.378 6057	224
6	+0.256 8060	+0.265 2422	−820	−0.870 8111	−0.868 6866	−142	−0.377 7136	−0.376 7921	−230
7	0.273 6573	0.282 0506	824	0.866 4944	0.864 2347	158	0.375 8413	0.374 8613	236
8	0.290 4216	0.298 7696	828	0.861 9078	0.859 5138	174	0.373 8521	0.372 8138	242
9	0.307 0939	0.315 3939	831	0.857 0530	0.854 5256	190	0.371 7466	0.370 6505	248
10	0.323 6690	0.331 9185	834	0.851 9319	0.849 2722	206	0.369 5257	0.368 3723	254
11	+0.340 1419	+0.348 3385	−836	−0.846 5466	−0.843 7555	−223	−0.367 1904	−0.365 9801	−260
12	0.356 5077	0.364 6490	838	0.840 8990	0.837 9775	240	0.364 7415	0.363 4747	265
13	0.372 7618	0.380 8455	839	0.834 9912	0.831 9404	257	0.362 1798	0.360 8569	271
14	0.388 8995	0.396 9233	840	0.828 8253	0.825 6462	274	0.359 5061	0.358 1275	277
15	0.404 9162	0.412 8778	841	0.822 4033	0.819 0969	291	0.356 7212	0.355 2873	283
16	+0.420 8074	+0.428 7045	−841	−0.815 7272	−0.812 2944	−308	−0.353 8260	−0.352 3373	−289
17	0.436 5685	0.444 3989	841	0.808 7988	0.805 2407	326	0.350 8213	0.349 2781	295
18	0.452 1950	0.459 9563	841	0.801 6203	0.797 9379	343	0.347 7079	0.346 1107	301
19	0.467 6823	0.475 3723	840	0.794 1937	0.790 3880	361	0.344 4867	0.342 8360	307
20	0.483 0257	0.490 6420	838	0.786 5210	0.782 5930	379	0.341 1587	0.339 4549	313
21	+0.498 2206	+0.505 7609	−836	−0.778 6043	−0.774 5552	−397	−0.337 7248	−0.335 9684	−319
22	0.513 2623	0.520 7243	834	0.770 4459	0.766 2767	415	0.334 1858	0.332 3772	325
23	0.528 1462	0.535 5276	831	0.762 0480	0.757 7601	433	0.330 5428	0.328 6827	331
24	0.542 8677	0.550 1660	828	0.753 4132	0.749 0077	451	0.326 7971	0.324 8860	336
25	0.557 4219	0.564 6347	824	0.744 5439	0.740 0221	469	0.322 9495	0.320 9879	342
26	+0.571 8040	+0.578 9292	−820	−0.735 4427	−0.730 8060	−487	−0.319 0012	−0.316 9897	−348
27	0.586 0097	0.593 0450	815	0.726 1124	0.721 3622	505	0.314 9536	0.312 8929	353
28	0.600 0345	0.606 9775	810	0.716 5559	0.711 6937	523	0.310 8078	0.308 6985	359
29	0.613 8735	0.620 7219	804	0.706 7760	0.701 8033	541	0.306 5651	0.304 4078	364
30	0.627 5222	0.634 2737	798	0.696 7758	0.691 6941	559	0.302 2269	0.300 0225	369
31	+0.640 9760	+0.647 6285	−792	−0.686 5585	−0.681 3695	−576	−0.297 7947	−0.295 5438	−375
Feb. 1	0.654 2307	0.660 7819	785	0.676 1275	0.670 8329	594	0.293 2699	0.290 9733	380
2	0.667 2817	0.673 7295	777	0.665 4863	0.660 0881	612	0.288 6541	0.286 3126	386
3	0.680 1248	0.686 4672	769	0.654 6386	0.649 1385	630	0.283 9490	0.281 5634	392
4	0.692 7561	0.698 9912	761	0.643 5883	0.637 9884	647	0.279 1561	0.276 7273	397
5	+0.705 1719	+0.711 2977	−752	−0.632 3392	−0.626 6413	−665	−0.274 2771	−0.271 8059	−402
6	0.717 3682	0.723 3830	743	0.620 8953	0.615 1016	682	0.269 3138	0.266 8011	407
7	0.729 3416	0.735 2437	733	0.609 2607	0.603 3731	699	0.264 2679	0.261 7145	412
8	0.741 0889	0.746 8768	723	0.597 4394	0.591 4600	716	0.259 1410	0.256 5478	417
9	0.752 6069	0.758 2789	712	0.585 4353	0.579 3659	733	0.253 9349	0.251 3026	422
10	+0.763 8925	+0.769 4473	−701	−0.573 2523	−0.567 0950	−750	−0.248 6512	−0.245 9808	−427
11	0.774 9429	0.780 3790	690	0.560 8945	0.554 6513	767	0.243 2916	0.240 5839	432
12	0.785 7551	0.791 0710	678	0.548 3658	0.542 0385	783	0.237 8578	0.235 1135	436
13	0.796 3262	0.801 5205	666	0.535 6698	0.529 2602	799	0.232 3513	0.229 5713	441
14	0.806 6535	0.811 7249	653	0.522 8103	0.516 3205	815	0.226 7738	0.223 9590	445
15	+0.816 7342	+0.821 6812	−640	−0.509 7913	−0.503 2232	−831	−0.221 1270	−0.218 2781	−449
16	*+0.826 5650*	*+0.831 3869*	−627	−0.496 6167	−0.489 9722	−847	−0.215 4125	−0.212 5304	−453

GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.	X True Equinox. Noon.	X True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Y True Equinox. Noon.	Y True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Z True Equinox. Noon.	Z True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.
May 17	+0.572 4568	+0.565 4885	+1349	+0.764 9736	+0.769 4392	−915	+0.331 8070	+0.333 7442	−217
18	0.558 4798	0.551 4311	1371	0.773 8502	0.778 2062	899	0.335 6577	0.337 5473	207
19	0.544 3430	0.537 2158	1392	0.782 5069	0.786 7520	883	0.339 4130	0.341 2545	197
20	0.530 0502	0.522 8466	1413	0.790 9414	0.795 0747	866	0.343 0718	0.344 8647	187
21	0.515 6054	0.508 3272	1434	0.799 1515	0.803 1716	849	0.346 6331	0.348 3768	176
22	+0.501 0124	+0.493 6615	+1455	+0.807 1347	+0.811 0405	−831	+0.350 0958	+0.351 7899	−165
23	0.486 2751	0.478 8537	1475	0.814 8887	0.818 6790	813	0.353 4589	0.355 1028	154
24	0.471 3977	0.463 9077	1495	0.822 4112	0.826 0849	795	0.356 7214	0.358 3146	143
25	0.456 3842	0.448 8277	1515	0.829 6997	0.833 2554	776	0.359 8823	0.361 4243	132
26	0.441 2389	0.433 6183	1535	0.836 7518	0.840 1885	757	0.362 9405	0.364 4308	121
27	+0.425 9664	+0.418 2838	+1554	+0.843 5652	+0.846 8817	−737	+0.365 8950	+0.367 3332	−110
28	0.410 5712	0.402 8291	1573	0.850 1378	0.853 3332	717	0.368 7451	0.370 1306	99
29	0.395 0582	0.387 2590	1592	0.856 4675	0.859 5406	696	0.371 4897	0.372 8222	87
30	0.379 4322	0.371 5784	1611	0.862 5523	0.865 5023	675	0.374 1281	0.375 4072	75
31	0.363 6982	0.355 7923	1629	0.868 3905	0.871 2166	654	0.376 6595	0.377 8850	63
June 1	+0.347 8611	+0.339 9054	+1647	+0.873 9805	+0.876 6819	−633	+0.379 0835	+0.380 2549	− 51
2	0.331 9259	0.323 9231	1664	0.879 3208	0.881 8970	611	0.381 3993	0.382 5166	39
3	0.315 8976	0.307 8500	1681	0.884 4105	0.886 8611	589	0.383 6066	0.384 6693	27
4	0.299 7810	0.291 6911	1698	0.889 2485	0.891 5727	566	0.385 7047	0.386 7128	15
5	0.283 5808	0.275 4509	1715	0.893 8337	0.896 0313	543	0.387 6934	0.388 6466	− 3
6	+0.267 3018	+0.259 1342	+1731	+0.898 1655	+0.900 2360	−519	+0.389 5723	+0.390 4705	+ 9
7	0.250 9487	0.242 7458	1747	0.902 2428	0.904 1857	495	0.391 3410	0.392 1839	21
8	0.234 5261	0.226 2902	1762	0.906 0647	0.907 8797	471	0.392 9991	0.393 7866	34
9	0.218 0385	0.209 7717	1777	0.909 6307	0.911 3176	446	0.394 5464	0.395 2784	46
10	0.201 4904	0.193 1951	1791	0.912 9402	0.914 4985	421	0.395 9825	0.396 6587	59
11	+0.184 8863	+0.176 5647	+1805	+0.915 9925	+0.917 4220	−396	+0.397 3069	+0.397 9272	+ 71
12	0.168 2308	0.159 8852	1819	0.918 7870	0.920 0874	370	0.398 5195	0.399 0839	84
13	0.151 5284	0.143 1610	1832	0.921 3231	0.922 4941	344	0.399 6202	0.400 1284	97
14	0.134 7835	0.126 3965	1845	0.923 6002	0.924 6415	317	0.400 6085	0.401 0604	110
15	0.118 0005	0.109 5961	1857	0.925 6178	0.926 5292	290	0.401 4841	0.401 8797	123
16	+0.101 1838	+0.092 7641	+1869	+0.927 3756	+0.928 1569	−263	+0.402 2470	+0.402 5861	+136
17	0.084 3377	0.075 9051	1880	0.928 8730	0.929 5239	236	0.402 8968	0.403 1792	149
18	0.067 4669	0.059 0236	1891	0.930 1095	0.930 6298	208	0.403 4332	0.403 6589	162
19	0.050 5758	0.042 1240	1902	0.931 0847	0.931 4741	180	0.403 8561	0.404 0249	175
20	0.033 6689	0.025 2110	1912	0.931 7980	0.932 0562	151	0.404 1653	0.404 2772	188
21	+0.016 7508	+0.008 2890	+1921	+0.932 2488	+0.932 3756	−122	+0.404 3605	+0.404 4153	+201
22	−0.000 1738	−0.008 6370	1930	0.932 4367	0.932 4320	93	0.404 4415	0.404 4391	214
23	0.017 1000	0.025 5622	1938	0.932 3615	0.932 2251	63	0.404 4082	0.404 3487	227
24	0.034 0229	0.042 4816	1946	0.932 0227	0.931 7543	33	0.404 2605	0.404 1437	240
25	0.050 9375	0.059 3901	1953	0.931 4200	0.931 0197	− 3	0.403 9983	0.403 8243	253
26	−0.067 8387	−0.076 2827	+1960	+0.930 5534	+0.930 0212	+ 28	+0.403 6217	+0.403 3905	+266
27	0.084 7213	0.093 1540	1966	0.929 4232	0.928 7593	58	0.403 1307	0.402 8424	279
28	0.101 5800	0.109 9988	1971	0.928 0295	0.927 2340	89	0.402 5255	0.402 1802	293
29	0.118 4097	0.126 8120	1976	0.926 3728	0.925 4460	120	0.401 8064	0.401 4042	306
30	0.135 2052	0.143 5886	1980	0.924 4537	0.923 3960	151	0.400 9736	0.400 5147	320
July 1	−0.151 9615	−0.160 3233	+1983	+0.922 2730	+0.921 0849	+182	+0.400 0276	+0.399 5122	+333
2	−0.168 6735	−0.177 0115	+1986	+0.919 8317	+0.918 5136	+214	+0.398 9686	+0.398 3969	+346

GREENWICH MEAN TIME.

Date.	X True Equinox. Noon.	X True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Y True Equinox. Noon.	Y True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Z True Equinox. Noon.	Z True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.
July 1	−0.151 9615	−0.160 3233	+1983	+0.922 2730	+0.921 0849	+ 182	+0.400 0276	+0.399 5122	+333
2	0.168 6735	0.177 0115	1986	0.919 8317	0.918 5136	214	0.398 9686	0.398 3969	346
3	0.185 3366	0.193 6483	1988	0.917 1308	0.915 6834	246	0.397 7971	0.397 1694	359
4	0.201 9459	0.210 2289	1990	0.914 1716	0.912 5955	278	0.396 5138	0.395 8303	372
5	0.218 4968	0.226 7489	1991	0.910 9551	0.909 2506	310	0.395 1190	0.394 3799	386
6	−0.234 9847	−0.243 2037	+1992	+0.907 4822	+0.905 6501	+ 343	+0.393 6132	+0.392 8188	+399
7	0.251 4052	0.259 5888	1991	0.903 7544	0.901 7954	375	0.391 9969	0.391 1475	412
8	0.267 7538	0.275 8998	1990	0.899 7732	0.897 6878	408	0.390 2707	0.389 3665	425
9	0.284 0261	0.292 1322	1988	0.895 5395	0.893 3283	441	0.388 4350	0.387 4763	438
10	0.300 2176	0.308 2818	1986	0.891 0546	0.888 7185	474	0.386 4904	0.385 4775	451
11	−0.316 3243	−0.324 3445	+1983	+0.886 3201	+0.883 8597	+ 507	+0.384 4376	+0.383 3708	+464
12	0.332 3418	0.340 3158	1980	0.881 3375	0.878 7536	540	0.382 2771	0.381 1566	477
13	0.348 2659	0.356 1916	1976	0.876 1081	0.873 4013	573	0.380 0093	0.378 8354	490
14	0.364 0925	0.371 9680	1971	0.870 6333	0.867 8042	606	0.377 6350	0.376 4080	502
15	0.379 8175	0.387 6406	1965	0.864 9143	0.861 9637	639	0.375 1546	0.373 8748	515
16	−0.395 4367	−0.403 2053	+1959	+0.858 9525	+0.855 8810	+ 673	+0.372 5688	+0.371 2366	+528
17	0.410 9458	0.418 6578	1952	0.852 7494	0.849 5578	706	0.369 8782	0.368 4937	541
18	0.426 3407	0.433 9940	1944	0.846 3064	0.842 9953	740	0.367 0833	0.365 6470	553
19	0.441 6172	0.449 2096	1935	0.839 6248	0.836 1950	774	0.364 1848	0.362 6969	566
20	0.456 7708	0.464 3001	1926	0.832 7060	0.829 1581	807	0.361 1833	0.359 6441	578
21	−0.471 7970	−0.479 2610	+1916	+0.825 5516	+0.821 8866	+ 840	+0.358 0795	+0.356 4895	+590
22	0.486 6915	0.494 0879	1905	0.818 1633	0.814 3820	873	0.354 8742	0.353 2337	602
23	0.501 4497	0.508 7762	1894	0.810 5429	0.806 6462	906	0.351 5682	0.349 8777	614
24	0.516 0669	0.523 3212	1882	0.802 6922	0.798 6811	939	0.348 1623	0.346 4222	626
25	0.530 5386	0.537 7184	1869	0.794 6131	0.790 4886	972	0.344 6574	0.342 8682	638
26	−0.544 8602	−0.551 9633	+1856	+0.786 3079	+0.782 0713	+1005	+0.341 0546	+0.339 2168	+649
27	0.559 0273	0.566 0515	1842	0.777 7791	0.773 4316	1038	0.337 3549	0.335 4691	661
28	0.573 0353	0.579 9783	1827	0.769 0291	0.764 5720	1070	0.333 5594	0.331 6261	672
29	0.586 8800	0.593 7398	1811	0.760 0607	0.755 4954	1103	0.329 6693	0.327 6892	683
30	0.600 5572	0.607 3318	1795	0.750 8766	0.746 2047	1135	0.325 6859	0.323 6596	694
31	−0.614 0630	−0.620 7504	+1778	+0.741 4799	+0.736 7027	+1167	+0.321 6104	+0.319 5385	+705
Aug. 1	0.627 3934	0.633 9917	1760	0.731 8733	0.726 9922	1199	0.317 4440	0.315 3271	716
2	0.640 5447	0.647 0520	1742	0.722 0597	0.717 0762	1231	0.313 1880	0.311 0268	727
3	0.653 5132	0.659 9278	1723	0.712 0422	0.706 9580	1262	0.308 8436	0.306 6387	737
4	0.666 2954	0.672 6156	1703	0.701 8239	0.696 6403	1293	0.304 4121	0.302 1640	748
5	−0.678 8879	−0.685 1119	+1683	+0.691 4076	+0.686 1262	+1324	+0.299 8947	+0.297 6042	+758
6	0.691 2871	0.697 4131	1662	0.680 7964	0.675 4187	1355	0.295 2928	0.292 9606	768
7	0.703 4896	0.709 5161	1640	0.669 9935	0.664 5211	1385	0.290 6077	0.288 2344	778
8	0.715 4922	0.721 4176	1618	0.659 0018	0.653 4361	1415	0.285 8407	0.283 4269	788
9	0.727 2919	0.733 1147	1595	0.647 8243	0.642 1669	1445	0.280 9931	0.278 5395	797
10	−0.738 8856	−0.744 6042	+1571	+0.636 4642	+0.630 7167	+1474	+0.276 0662	+0.273 5734	+807
11	0.750 2701	0.755 8829	1547	0.624 9246	0.619 0883	1503	0.271 0612	0.268 5299	816
12	0.761 4423	0.766 9479	1522	0.613 2083	0.607 2849	1532	0.265 9795	0.263 4103	825
13	0.772 3993	0.777 7961	1496	0.601 3184	0.595 3093	1560	0.260 8223	0.258 2157	834
14	0.783 1380	0.788 4246	1470	0.589 2580	0.583 1648	1588	0.255 5908	0.252 9478	843
15	−0.793 6555	−0.798 8303	+1443	+0.577 0300	+0.570 8541	+1616	+0.250 2867	+0.247 6076	+851
16	*−0.803 9485*	*−0.809 0098*	*+1415*	+0.564 6373	+0.558 3801	+1643	+0.244 9108	+0.242 1965	+859

GREENWICH MEAN TIME.

Date.	X True Equinox. Noon.	X True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Y True Equinox. Noon.	Y True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.	Z True Equinox. Noon.	Z True Equinox. Midnight.	Reduc. to Mean Eq'x of 1919.0. Noon.
Aug. 16	−0.803 9485	−0.809 0098	+1415	+0.564 6373	+0.558 3801	+1643	+0.244 9108	+0.242 1965	+859
17	0.814 0138	0.818 9601	1387	0.552 0829	0.545 7461	1670	0.239 4649	0.236 7160	867
18	0.823 8483	0.828 6780	1358	0.539 3701	0.532 9553	1696	0.233 9501	0.231 1673	875
19	0.833 4488	0.838 1603	1329	0.526 5021	0.520 0109	1722	0.228 3679	0.225 5520	883
20	0.842 8120	0.847 4035	1299	0.513 4822	0.506 9164	1747	0.222 7199	0.219 8717	890
21	−0.851 9345	−0.856 4046	+1269	+0.500 3140	+0.493 6754	+1772	+0.217 0076	+0.214 1279	+897
22	0.860 8133	0.865 1604	1238	0.487 0012	0.480 2917	1797	0.211 2327	0.208 3223	904
23	0.869 4454	0.873 6680	1207	0.473 5475	0.466 7690	1821	0.205 3969	0.202 4567	911
24	0.877 8277	0.881 9243	1175	0.459 9568	0.453 1114	1845	0.199 5018	0.196 5325	918
25	0.885 9573	0.889 9264	1142	0.446 2332	0.439 3229	1868	0.193 5491	0.190 5518	924
26	−0.893 8314	−0.897 6719	+1109	+0.432 3809	+0.425 4078	+1890	+0.187 5408	+0.184 5164	+930
27	0.901 4476	0.905 1582	1076	0.418 4041	0.411 3703	1912	0.181 4787	0.178 4280	936
28	0.908 8035	0.912 3831	1042	0.404 3070	0.397 2148	1933	0.175 3646	0.172 2886	942
29	0.915 8969	0.919 3445	1007	0.390 0941	0.382 9455	1954	0.169 2003	0.166 0999	947
30	0.922 7256	0.926 0401	972	0.375 7695	0.368 5667	1974	0.162 9876	0.159 8637	952
31	−0.929 2877	−0.932 4682	+ 937	+0.361 3376	+0.354 0827	+1994	+0.156 7284	+0.153 5820	+957
Sept. 1	0.935 5814	0.938 6269	901	0.346 8026	0.339 4978	2013	0.150 4246	0.147 2565	962
2	0.941 6046	0.944 5142	865	0.332 1688	0.324 8162	2032	0.144 0779	0.140 8891	966
3	0.947 3557	0.950 1288	828	0.317 4406	0.310 0424	2050	0.137 6902	0.134 4815	970
4	0.952 8334	0.955 4693	791	0.302 6222	0.295 1805	2067	0.131 2633	0.128 0358	974
5	−0.958 0362	−0.960 5340	+ 753	+0.287 7178	+0.280 2347	+2084	+0.124 7991	+0.121 5536	+978
6	0.962 9626	0.965 3217	715	0.272 7317	0.265 2094	2100	0.118 2994	0.115 0367	981
7	0.967 6112	0.969 8310	677	0.257 6682	0.250 1087	2116	0.111 7659	0.108 4871	984
8	0.971 9809	0.974 0608	638	0.242 5313	0.234 9367	2131	0.105 2005	0.101 9064	986
9	0.976 0706	0.978 0101	599	0.227 3253	0.219 6976	2145	0.098 6049	0.095 2963	989
10	−0.979 8791	−0.981 6775	+ 560	+0.212 0540	+0.204 3951	+2159	+0.091 9808	+0.088 6586	+991
11	0.983 4052	0.985 0619	521	0.196 7215	0.189 0336	2172	0.085 3300	0.081 9952	993
12	0.986 6476	0.988 1620	481	0.181 3319	0.173 6169	2185	0.078 6543	0.075 3077	994
13	0.989 6051	0.990 9766	441	0.165 8891	0.158 1490	2197	0.071 9555	0.068 5980	995
14	0.992 2764	0.993 5043	401	0.150 3971	0.142 6340	2208	0.065 2353	0.061 8677	996
15	−0.994 6602	−0.995 7439	+ 360	+0.134 8602	+0.127 0762	+2218	+0.058 4955	+0.055 1189	+997
16	0.996 7553	0.997 6942	319	0.119 2826	0.111 4799	2228	0.051 7381	0.048 3533	998
17	0.998 5604	0.999 3538	278	0.103 6686	0.095 8493	2237	0.044 9649	0.041 5730	998
18	1.000 0743	1.000 7217	236	0.088 0227	0.080 1893	2246	0.038 1780	0.034 7801	998
19	1.001 2959	1.001 7968	194	0.072 3496	0.064 5043	2254	0.031 3795	0.027 9765	998
20	−1.002 2242	−1.002 5782	+ 152	+0.056 6539	+0.048 7991	+2262	+0.024 5713	+0.021 1643	+997
21	1.002 8585	1.003 0651	110	0.040 9405	0.033 0787	2269	0.017 7556	0.014 3456	996
22	1.003 1980	1.003 2571	68	0.025 2142	0.017 3477	2275	0.010 9344	0.007 5224	995
23	1.003 2423	1.003 1537	+ 26	+0.009 4799	+0.001 6113	2280	+0.004 1099	+0.000 6971	993
24	1.002 9911	1.002 7546	− 17	−0.006 2574	−0.014 1257	2285	−0.002 7158	−0.006 1284	991
25	−1.002 4441	−1.002 0597	− 59	−0.021 9929	−0.029 8584	+2289	−0.009 5405	−0.012 9518	+989
26	1.001 6014	1.001 0692	102	0.037 7215	0.045 5817	2292	0.016 3621	0.019 7711	987
27	1.000 4632	0.999 7833	145	0.053 4383	0.061 2908	2295	0.023 1785	0.026 5842	984
28	0.999 0297	0.998 2023	188	0.069 1386	0.076 9810	2297	0.029 9879	0.033 3891	981
29	0.997 3013	0.996 3267	231	0.084 8175	0.092 6474	2298	0.036 7877	0.040 1835	978
30	−0.995 2786	−0.994 1571	− 274	−0.100 4701	−0.108 2851	+2299	−0.043 5763	−0.046 9657	+974
Oct. 1	−0.992 9622	−0.991 6941	− 317	−0.116 0918	−0.123 8896	+2299	−0.050 3515	−0.053 7335	+970

GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1919.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1919.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1919.0.
	Noon.	*Midnight.*	*Noon.*	*Noon.*	*Midnight.*	*Noon.*	*Noon.*	*Midnight.*	*Noon.*
Oct. 1	−0.992 9622	−0.991 6941	− 317	−0.116 0918	−0.123 8896	+2299	−0.050 3515	−0.053 7335	+970
2	0.990 3528	0.988 9384	361	0.131 6779	0.139 4561	2298	0.057 1114	0.060 4849	965
3	0.987 4511	0.985 8910	404	0.147 2237	0.154 9801	2296	0.063 8538	0.067 2179	960
4	0.984 2581	0.982 5527	448	0.162 7246	0.170 4568	2294	0.070 5770	0.073 9307	955
5	0.980 7748	0.978 9246	492	0.178 1760	0.185 8818	2291	0.077 2788	0.080 6211	950
6	−0.977 0023	−0.975 0079	− 535	−0.193 5737	−0.201 2510	+2288	−0.083 9574	−0.087 2874	+944
7	0.972 9416	0.970 8037	579	0.208 9132	0.216 5598	2284	0.090 6109	0.093 9277	938
8	0.968 5942	0.966 3134	622	0.224 1903	0.231 8041	2279	0.097 2376	0.100 5403	932
9	0.963 9613	0.961 5380	665	0.239 4008	0.246 9797	2274	0.103 8355	0.107 1231	926
10	0.959 0437	0.956 4785	708	0.254 5404	0.262 0824	2268	0.110 4028	0.113 6744	919
11	−0.953 8425	−0.951 1359	− 751	−0.269 6052	−0.277 1082	+2261	−0.116 9377	−0.120 1925	+912
12	0.948 3587	0.945 5111	794	0.284 5909	0.292 0528	2254	0.123 4384	0.126 6753	905
13	0.942 5933	0.939 6053	837	0.299 4933	0.306 9118	2246	0.129 9029	0.133 1210	897
14	0.936 5473	0.933 4195	880	0.314 3079	0.321 6810	2237	0.136 3292	0.139 5275	889
15	0.930 2220	0.926 9550	923	0.329 0305	0.336 3559	2227	0.142 7156	0.145 8932	881
16	−0.923 6186	−0.920 2130	− 966	−0.343 6565	−0.350 9318	+2217	−0.149 0600	−0.152 2157	+872
17	0.916 7384	0.913 1950	1009	0.358 1812	0.365 4041	2206	0.155 3602	0.158 4932	863
18	0.909 5829	0.905 9024	1051	0.372 6000	0.379 7682	2195	0.161 6144	0.164 7236	853
19	0.902 1538	0.898 3372	1094	0.386 9082	0.394 0194	2183	0.167 8204	0.170 9047	844
20	0.894 4528	0.890 5010	1136	0.401 1012	0.408 1531	2170	0.173 9762	0.177 0347	834
21	−0.886 4821	−0.882 3963	−1178	−0.415 1744	−0.422 1646	+2157	−0.180 0800	−0.183 1117	+824
22	0.878 2438	0.874 0250	1220	0.429 1230	0.436 0491	2143	0.186 1296	0.189 1334	813
23	0.869 7402	0.865 3897	1262	0.442 9424	0.449 8022	2128	0.192 1230	0.195 0980	802
24	0.860 9738	0.856 4929	1303	0.456 6280	0.463 4193	2113	0.198 0583	0.201 0036	791
25	0.851 9472	0.847 3371	1344	0.470 1755	0.476 8960	2097	0.203 9337	0.206 8483	780
26	−0.842 6630	−0.837 9252	−1385	−0.483 5803	−0.490 2279	+2081	−0.209 7471	−0.212 6300	+768
27	0.833 1242	0.828 2603	1426	0.496 8382	0.503 4107	2064	0.215 4968	0.218 3472	756
28	0.823 3338	0.818 3451	1466	0.509 9450	0.516 4405	2046	0.221 1811	0.223 9981	744
29	0.813 2946	0.808 1827	1507	0.522 8966	0.529 3128	2027	0.226 7980	0.229 5807	732
30	0.803 0098	0.797 7763	1547	0.535 6887	0.542 0238	2008	0.232 3460	0.235 0936	719
31	−0.792 4827	−0.787 1293	−1587	−0.548 3175	−0.554 5695	+1988	−0.237 8233	−0.240 5349	+706
Nov. 1	0.781 7166	0.776 2449	1627	0.560 7792	0.566 9461	1967	0.243 2282	0.245 9030	693
2	0.770 7148	0.765 1266	1666	0.573 0698	0.579 1498	1946	0.248 5590	0.251 1962	679
3	0.759 4808	0.753 7777	1705	0.585 1858	0.591 1773	1924	0.253 8143	0.256 4131	665
4	0.748 0179	0.742 2018	1744	0.597 1238	0.603 0249	1902	0.258 9925	0.261 5522	651
5	−0.736 3298	−0.730 4023	−1782	−0.608 8802	−0.614 6893	+1879	−0.264 0921	−0.266 6119	+637
6	0.724 4198	0.718 3826	1820	0.620 4519	0.626 1675	1855	0.269 1116	0.271 5909	622
7	0.712 2912	0.706 1460	1858	0.631 8356	0.637 4559	1831	0.274 0497	0.276 4878	607
8	0.699 9473	0.693 6956	1895	0.643 0281	0.648 5517	1806	0.278 9050	0.281 3011	592
9	0.687 3914	0.681 0350	1932	0.654 0262	0.659 4513	1781	0.283 6759	0.286 0293	576
10	−0.674 6269	−0.668 1674	−1969	−0.664 8266	−0.670 1515	+1755	−0.288 3610	−0.290 6710	+560
11	0.661 6570	0.655 0961	2005	0.675 4258	0.680 6490	1728	0.292 9589	0.295 2246	545
12	0.648 4850	0.641 8243	2041	0.685 8207	0.690 9404	1700	0.297 4680	0.299 6888	529
13	0.635 1143	0.628 3555	2076	0.696 0077	0.701 0223	1672	0.301 8868	0.304 0619	513
14	0.621 5485	0.614 6937	2111	0.705 9836	0.710 8913	1643	0.306 2138	0.308 3424	496
15	−0.607 7915	−0.600 8425	−2145	−0.715 7448	−0.720 5437	+1614	−0.310 4475	−0.312 5289	+479
16	−0.593 8471	−0.586 8058	−2179	−0.725 2876	−0.729 9762	+1584	−0.314 5864	−0.316 6198	+462

GREENWICH MEAN TIME.

Date.	X True Equinox.		Reduc. to Mean Eq'x of 1919.0.	Y True Equinox.		Reduc. to Mean Eq'x of 1919.0.	Z True Equinox.		Reduc. to Mean Eq'x of 1919.0.
	Noon.	*Midnight.*	*Noon.*	*Noon.*	*Midnight.*	*Noon.*	*Noon.*	*Midnight.*	*Noon.*
ov.16	−0.593 8471	−0.586 8058	−2179	−0.725 2876	−0.729 9762	+1584	−0.314 5864	−0.316 6198	+462
17	0.579 7192	0.572 5879	2212	0.734 6089	0.739 1854	1553	0.318 6290	0.320 6138	444
18	0.565 4123	0.558 1930	2245	0.743 7053	0.748 1681	1522	0.322 5739	0.324 5093	426
19	0.550 9305	0.543 6255	2278	0.752 5735	0.756 9211	1490	0.326 4197	0.328 3051	409
20	0.536 2784	0.528 8899	2310	0.761 2104	0.765 4411	1458	0.330 1652	0.331 9999	391
21	−0.521 4605	−0 513 9908	−2342	−0.769 6129	−0.773 7254	+1425	−0.333 8090	−0.335 5923	+373
22	0.506 4813	0.498 9327	2373	0.777 7782	0.781 7710	1391	0.337 3497	0.339 0811	355
23	0.491 3457	0.483 7207	2404	0.785 7034	0.789 5750	1357	0.340 7863	0.342 4652	336
24	0.476 0585	0.468 3596	2434	0.793 3856	0.797 1348	1322	0.344 1177	0.345 7436	317
25	0.460 6247	0.452 8544	2463	0.800 8224	0.804 4480	1287	0.347 3427	0.348 9149	298
26	−0.445 0493	−0.437 2100	−2492	−0.808 0114	−0.811 5122	+1251	−0.350 4602	−0.351 9784	+279
27	0.429 3372	0.421 4315	2520	0.814 9502	0.818 3251	1215	0.353 4694	0.354 9330	260
28	0.413 4935	0.405 5239	2547	0.821 6366	0.824 8845	1178	0.356 3692	0.357 7779	241
29	0.397 5232	0.389 4922	2574	0.828 0686	0.831 1885	1140	0.359 1589	0.360 5121	221
30	0.381 4315	0.373 3418	2600	0.834 2441	0.837 2351	1102	0.361 8375	0.363 1348	202
ec. 1	−0.365 2236	−0.357 0777	−2626	−0.840 1614	−0.843 0227	+1063	−0.364 4041	−0.365 6453	+182
2	0.348 9046	0.340 7050	2651	0.845 8189	0.848 5498	1024	0.366 8583	0.368 0430	162
3	0.332 4795	0.324 2287	2675	0.851 2152	0.853 8149	984	0.369 1993	0.370 3272	142
4	0.315 9533	0.307 6538	2699	0.856 3488	0.858 8167	944	0.371 4265	0.372 4972	122
5	0.299 3309	0.290 9852	2722	0.861 2184	0.863 5538	903	0.373 5392	0.374 5525	101
6	−0.282 6173	−0.274 2277	−2744	−0.865 8228	−0.868 0252	+ 862	−0.375 5369	−0.376 4924	+ 81
7	0.265 8171	0.257 3860	2766	0.870 1608	0.872 2294	820	0.377 4190	0.378 3166	60
8	0.248 9351	0.240 4649	2787	0.874 2310	0.876 1653	777	0.379 1850	0.380 0242	39
9	0.231 9760	0.223 4690	2807	0.878 0322	0.879 8315	734	0.380 8342	0.381 6148	+ 18
10	0.214 9445	0.206 4031	2827	0.881 5629	0.883 2264	690	0.382 3660	0.383 0876	− 3
11	−0.197 8454	−0.189 2721	−2845	−0.884 8217	−0.886 3488	+ 646	−0.383 7797	−0.384 4421	− 24
12	0.180 6839	0.172 0813	2862	0.887 8075	0.889 1976	602	0.385 0748	0.385 6776	45
13	0.163 4649	0.154 8354	2879	0.890 5189	0.891 7712	557	0.386 2506	0.386 7937	66
14	0.146 1935	0.137 5398	2895	0.892 9544	0.894 0683	512	0.387 3067	0.387 7897	87
15	0.128 8751	0.120 2000	2910	0.895 1129	0.896 0880	466	0.388 2425	0.388 6652	108
16	−0.111 5152	−0.102 8214	−2924	−0.896 9935	−0.897 8292	+ 420	−0.389 0577	−0.389 4199	−129
17	0.094 1192	0.085 4094	2938	0.898 5950	0.899 2909	373	0.389 7517	0.390 0532	151
18	0.076 6928	0.067 9699	2950	0.899 9167	0.900 4723	326	0.390 3243	0.390 5650	172
19	0.059 2414	0.050 5081	2962	0.900 9578	0.901 3730	279	0.390 7752	0.390 9549	194
20	0.041 7707	0.033 0299	2973	0.901 7180	0.901 9926	231	0.391 1042	0.391 2230	215
21	−0.024 2865	−0.015 5411	−2984	−0.902 1967	−0.902 3304	+ 183	−0.391 3112	−0.391 3689	−237
22	−0.006 7945	+0.001 9527	2993	0.902 3936	0.902 3863	135	0.391 3960	0.391 3925	258
23	+0.010 6997	0.019 4458	3001	0.902 3085	0.902 1602	86	0.391 3585	0.391 2939	280
24	0.028 1902	0.036 9323	3008	0.901 9414	0.901 6521	+ 37	0.391 1988	0.391 0731	301
25	0.045 6713	0.054 4065	3015	0.901 2924	0.900 8623	− 13	0.390 9170	0.390 7304	323
26	+0.063 1373	+0.071 8629	−3020	−0.900 3618	−0.899 7910	− 63	−0.390 5133	−0.390 2658	−344
27	0.080 5825	0.089 2955	3024	0.899 1500	0.898 4389	113	0.389 9878	0.389 6795	366
28	0.098 0012	0.106 6989	3027	0.897 6577	0.896 8065	163	0.389 3408	0.388 9718	387
29	0.115 3878	0.124 0673	3030	0.895 8855	0.894 8947	213	0.388 5725	0.388 1430	409
30	0.132 7368	0.141 3956	3031	0.893 8344	0.892 7046	263	0.387 6834	0.387 1936	430
31	+0.150 0429	+0.158 6782	−3031	−0.891 5055	−0.890 2371	− 314	−0.386 6738	−0.386 1240	−452
32	+0.167 3007	+0.175 9009	−3031	−0.888 8996	−0.887 4932	− 365	−0.385 5442	−0.384 9346	−473

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GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
	JANUARY 25.			
	h m s	s	° ′ ″	″
0	15 2 48.27	2.0646	−19 20 3.7	−5.900
1	15 4 52.25	2.0681	19 25 55.2	5.815
2	15 6 56.44	2.0715	19 31 41.5	5.729
3	15 9 0.83	2.0749	19 37 22.7	5.644
4	15 11 5.43	2.0783	19 42 58.8	5.558
5	15 13 10.23	2.0818	19 48 29.6	5.470
6	15 15 15.25	2.0853	19 53 55.2	5.383
7	15 17 20.47	2.0888	19 59 15.5	5.294
8	15 19 25.90	2.0922	20 4 30.5	5.205
9	15 21 31.53	2.0956	20 9 40.1	5.115
10	15 23 37.37	2.0991	20 14 44.3	5.024
11	15 25 43.42	2.1026	20 19 43.0	4.933
12	15 27 49.68	2.1060	20 24 36.3	4.843
13	15 29 56.14	2.1094	20 29 24.1	4.750
14	15 32 2.81	2.1129	20 34 6.3	4.657
15	15 34 9.69	2.1163	20 38 42.9	4.564
16	15 36 16.77	2.1198	20 43 14.0	4.470
17	15 38 24.06	2.1232	20 47 39.3	4.375
18	15 40 31.55	2.1266	20 51 59.0	4.280
19	15 42 39.25	2.1300	20 56 12.9	4.183
20	15 44 47.15	2.1334	21 0 21.0	4.088
21	15 46 55.26	2.1368	21 4 23.4	3.991
22	15 49 3.57	2.1402	21 8 19.9	3.893
23	15 51 12.08	2.1435	−21 12 10.5	−3.794
	JANUARY 26.			
0	15 53 20.79	2.1468	−21 15 55.2	−3.696
1	15 55 29.70	2.1502	21 19 34.0	3.597
2	15 57 38.81	2.1535	21 23 6.8	3.496
3	15 59 48.12	2.1568	21 26 33.5	3.395
4	16 1 57.63	2.1602	21 29 54.2	3.295
5	16 4 7.34	2.1633	21 33 8.9	3.193
6	16 6 17.23	2.1666	21 36 17.3	3.090
7	16 8 27.33	2.1698	21 39 19.7	2.988
8	16 10 37.61	2.1730	21 42 15.8	2.884
9	16 12 48.09	2.1762	21 45 5.8	2.781
10	16 14 58.75	2.1793	21 47 49.5	2.675
11	16 17 9.60	2.1824	21 50 26.8	2.570
12	16 19 20.64	2.1855	21 52 57.9	2.465
13	16 21 31.86	2.1886	21 55 22.6	2.359
14	16 23 43.27	2.1917	21 57 41.0	2.253
15	16 25 54.86	2.1946	21 59 52.9	2.145
16	16 28 6.62	2.1975	22 1 58.4	2.038
17	16 30 18.56	2.2005	22 3 57.4	1.929
18	16 32 30.68	2.2034	22 5 49.9	1.820
19	16 34 42.97	2.2063	22 7 35.8	1.711
20	16 36 55.43	2.2091	22 9 15.2	1.602
21	16 39 8.06	2.2119	22 10 48.0	1.492
22	16 41 20.86	2.2147	22 12 14.2	1.381
23	16 43 33.82	2.2173	22 13 33.7	1.270
24	*16 45 46.94*	*2.2201*	*−22 14 46.6*	*−1.159*

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
	JANUARY 27.			
	h m s	s	° ′ ″	″
0	16 45 46.94	2.2201	−22 14 46.6	−1.
1	16 48 0.23	2.2228	22 15 52.8	1.
2	16 50 13.67	2.2253	22 16 52.2	0.9
3	16 52 27.27	2.2279	22 17 44.9	0.
4	16 54 41.02	2.2304	22 18 30.8	0.
5	16 56 54.92	2.2329	22 19 9.8	0.
6	16 59 8.97	2.2353	22 19 42.1	0.
7	17 1 23.16	2.2378	22 20 7.5	0.
8	17 3 37.50	2.2402	22 20 26.0	0.
9	17 5 51.98	2.2424	22 20 37.6	0.
10	17 8 6.59	2.2447	22 20 42.3	−0.
11	17 10 21.34	2.2469	22 20 40.1	+0.
12	17 12 36.22	2.2491	22 20 30.9	0.
13	17 14 51.23	2.2513	22 20 14.7	0.
14	17 17 6.37	2.2533	22 19 51.6	0.
15	17 19 21.63	2.2553	22 19 21.4	0.
16	17 21 37.00	2.2573	22 18 44.2	0.
17	17 23 52.50	2.2593	22 17 59.9	0.
18	17 26 8.11	2.2611	22 17 8.5	0.
19	17 28 23.83	2.2628	22 16 10.1	1.
20	17 30 39.65	2.2647	22 15 4.6	1.
21	17 32 55.59	2.2664	22 13 51.9	1.
22	17 35 11.62	2.2680	22 12 32.2	1.
23	17 37 27.75	2.2697	−22 11 5.3	+1.
	JANUARY 28.			
0	17 39 43.98	2.2713	−22 9 31.2	+1.
1	17 42 0.30	2.2728	22 7 50.0	1.
2	17 44 16.71	2.2742	22 6 1.6	1.
3	17 46 33.20	2.2756	22 4 6.0	1.
4	17 48 49.78	2.2770	22 2 3.2	2.
5	17 51 6.44	2.2783	21 59 53.3	2.
6	17 53 23.17	2.2795	21 57 36.1	2.
7	17 55 39.98	2.2807	21 55 11.7	2
8	17 57 56.85	2.2818	21 52 40.1	2
9	18 0 13.79	2.2828	21 50 1.3	2
10	18 2 30.79	2.2838	21 47 15.3	2
11	18 4 47.85	2.2848	21 44 22.1	2
12	18 7 4.97	2.2858	21 41 21.6	3
13	18 9 22.14	2.2867	21 38 13.9	3
14	18 11 39.37	2.2875	21 34 58.9	3
15	18 13 56.64	2.2882	21 31 36.8	3
16	18 16 13.95	2.2888	21 28 7.4	3
17	18 18 31.30	2.2895	21 24 30.8	3
18	18 20 48.69	2.2902	21 20 47.0	3
19	18 23 6.12	2.2907	21 16 55.9	3
20	18 25 23.57	2.2911	21 12 57.7	4
21	18 27 41.05	2.2916	21 8 52.3	4
22	18 29 58.56	2.2920	21 4 39.6	4
23	18 32 16.09	2.2923	21 0 19.8	4
24	18 34 33.63	2.2925	−20 55 52.8	+4

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GREENWICH MEAN TIME.

MARCH 18.

Hour.	Right Ascension. h m s	Var. per Min. s	Declination. ° ′ ″	Var. per Min. ″
0	12 58 10.61	1.9137	−10 20 6.7	−9.940
1	13 0 5.47	1.9150	10 30 1.7	9.894
2	13 2 0.41	1.9163	10 39 54.0	9.847
3	13 3 55.43	1.9178	10 49 43.3	9.798
4	13 5 50.54	1.9191	10 59 29.8	9.750
5	13 7 45.72	1.9205	11 9 13.3	9.700
6	13 9 41.00	1.9220	11 18 53.8	9.650
7	13 11 36.36	1.9234	11 28 31.3	9.599
8	13 13 31.81	1.9250	11 38 5.7	9.548
9	13 15 27.36	1.9266	11 47 37.0	9.496
10	13 17 23.00	1.9281	11 57 5.2	9.443
11	13 19 18.73	1.9297	12 6 30.2	9.390
12	13 21 14.56	1.9313	12 15 52.0	9.336
13	13 23 10.49	1.9330	12 25 10.5	9.282
14	13 25 6.52	1.9348	12 34 25.8	9.227
15	13 27 2.66	1.9364	12 43 37.7	9.171
16	13 28 58.89	1.9382	12 52 46.3	9.115
17	13 30 55.24	1.9400	13 1 51.5	9.058
18	13 32 51.69	1.9418	13 10 53.2	9.000
19	13 34 48.25	1.9436	13 19 51.5	8.943
20	13 36 44.92	1.9454	13 28 46.3	8.883
21	13 38 41.70	1.9473	13 37 37.5	8.824
22	13 40 38.59	1.9492	13 46 25.2	8.764
23	13 42 35.60	1.9511	−13 55 9.2	−8.703

MARCH 19.

Hour.	Right Ascension. h m s	Var. per Min. s	Declination. ° ′ ″	Var. per Min. ″
0	13 44 32.72	1.9530	−14 3 49.6	−8.643
1	13 46 29.96	1.9550	14 12 26.3	8.581
2	13 48 27.32	1.9570	14 20 59.3	8.518
3	13 50 24.80	1.9590	14 29 28.5	8.455
4	13 52 22.40	1.9611	14 37 53.9	8.392
5	13 54 20.13	1.9632	14 46 15.5	8.328
6	13 56 17.98	1.9652	14 54 33.2	8.263
7	13 58 15.95	1.9673	15 2 47.0	8.198
8	14 0 14.05	1.9693	15 10 56.9	8.132
9	14 2 12.27	1.9715	15 19 2.8	8.065
10	14 4 10.63	1.9737	15 27 4.7	7.998
11	14 6 9.11	1.9758	15 35 2.6	7.931
12	14 8 7.72	1.9779	15 42 56.4	7.863
13	14 10 6.46	1.9802	15 50 46.1	7.793
14	14 12 5.34	1.9824	15 58 31.6	7.724
15	14 14 4.35	1.9847	16 6 13.0	7.654
16	14 16 3.50	1.9868	16 13 50.1	7.583
17	14 18 2.77	1.9891	16 21 23.0	7.512
18	14 20 2.19	1.9914	16 28 51.5	7.440
19	14 22 1.74	1.9937	16 36 15.8	7.368
20	14 24 1.43	1.9960	16 43 35.7	7.296
21	14 26 1.26	1.9983	16 50 51.3	7.223
22	14 28 1.22	2.0006	16 58 2.4	7.148
23	14 30 1.33	2.0029	17 5 9.0	7.073
24	14 32 1.57	2.0053	−17 12 11.2	−6.999

MARCH 20.

Hour.	Right Ascension. h m s	Var. per Min. s	Declination. ° ′ ″	Var. per Min. ″
0	14 32 1.57	2.0053	−17 12 11.2	−6.999
1	14 34 1.96	2.0077	17 19 8.9	6.923
2	14 36 2.49	2.0100	17 26 2.0	6.847
3	14 38 3.16	2.0123	17 32 50.5	6.770
4	14 40 3.97	2.0148	17 39 34.4	6.693
5	14 42 4.93	2.0172	17 46 13.7	6.615
6	14 44 6.03	2.0195	17 52 48.2	6.537
7	14 46 7.27	2.0219	17 59 18.1	6.458
8	14 48 8.66	2.0243	18 5 43.2	6.378
9	14 50 10.19	2.0268	18 12 3.5	6.298
10	14 52 11.87	2.0292	18 18 19.0	6.218
11	14 54 13.69	2.0316	18 24 29.7	6.138
12	14 56 15.66	2.0340	18 30 35.5	6.056
13	14 58 17.77	2.0364	18 36 36.4	5.974
14	15 0 20.03	2.0388	18 42 32.4	5.892
15	15 2 22.43	2.0413	18 48 23.4	5.808
16	15 4 24.98	2.0438	18 54 9.4	5.724
17	15 6 27.68	2.0462	18 59 50.3	5.640
18	15 8 30.52	2.0485	19 5 26.2	5.556
19	15 10 33.50	2.0509	19 10 57.0	5.471
20	15 12 36.63	2.0533	19 16 22.7	5.386
21	15 14 39.90	2.0558	19 21 43.3	5.299
22	15 16 43.32	2.0582	19 26 58.6	5.213
23	15 18 46.88	2.0606	−19 32 8.8	−5.126

MARCH 21.

Hour.	Right Ascension. h m s	Var. per Min. s	Declination. ° ′ ″	Var. per Min. ″
0	15 20 50.59	2.0630	−19 37 13.7	−5.038
1	15 22 54.44	2.0654	19 42 13.3	4.950
2	15 24 58.44	2.0678	19 47 7.7	4.862
3	15 27 2.58	2.0703	19 51 56.7	4.773
4	15 29 6.87	2.0727	19 56 40.4	4.681
5	15 31 11.30	2.0750	20 1 18.8	4.593
6	15 33 15.87	2.0773	20 5 51.6	4.503
7	15 35 20.58	2.0797	20 10 19.1	4.413
8	15 37 25.43	2.0820	20 14 41.1	4.321
9	15 39 30.42	2.0844	20 18 57.6	4.229
10	15 41 35.56	2.0868	20 23 8.6	4.138
11	15 43 40.83	2.0890	20 27 14.1	4.045
12	15 45 46.24	2.0913	20 31 14.0	3.952
13	15 47 51.79	2.0937	20 35 8.3	3.858
14	15 49 57.48	2.0959	20 38 57.0	3.764
15	15 52 3.30	2.0982	20 42 40.0	3.670
16	15 54 9.26	2.1005	20 46 17.4	3.575
17	15 56 15.36	2.1028	20 49 49.0	3.480
18	15 58 21.59	2.1049	20 53 15.0	3.385
19	16 0 27.95	2.1071	20 56 35.2	3.288
20	16 2 34.44	2.1093	20 59 49.6	3.192
21	16 4 41.07	2.1115	21 2 58.2	3.095
22	16 6 47.82	2.1137	21 6 1.0	2.998
23	16 8 54.71	2.1158	21 8 58.0	2.901
24	16 11 1.72	2.1179	−21 11 49.1	−2.809

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GREENWICH MEAN TIME.

JUNE 14.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
	h m s	s	° ′ ″	″
0	18 6 21.85	2.1789	−20 59 39.7	+2.826
1	18 8 32.58	2.1787	20 56 47.0	2.932
2	18 10 43.29	2.1783	20 53 47.9	3.038
3	18 12 53.98	2.1780	20 50 42.5	3.142
4	18 15 4.65	2.1776	20 47 30.9	3.246
5	18 17 15.29	2.1773	20 44 13.0	3.351
6	18 19 25.92	2.1768	20 40 48.8	3.455
7	18 21 36.51	2.1763	20 37 18.4	3.559
8	18 23 47.07	2.1758	20 33 41.7	3.663
9	18 25 57.61	2.1753	20 29 58.8	3.767
10	18 28 8.10	2.1746	20 26 9.7	3.870
11	18 30 18.56	2.1740	20 22 14.4	3.973
12	18 32 28.98	2.1733	20 18 12.9	4.077
13	18 34 39.36	2.1726	20 14 5.2	4.179
14	18 36 49.69	2.1718	20 9 51.4	4.281
15	18 38 59.98	2.1711	20 5 31.5	4.383
16	18 41 10.22	2.1703	20 1 5.5	4.485
17	18 43 20.41	2.1694	19 56 33.3	4.587
18	18 45 30.55	2.1686	19 51 55.1	4.687
19	18 47 40.64	2.1677	19 47 10.9	4.788
20	18 49 50.67	2.1667	19 42 20.6	4.888
21	18 52 0.64	2.1658	19 37 24.3	4.988
22	18 54 10.56	2.1648	19 32 22.0	5.088
23	18 56 20.42	2.1638	−19 27 13.7	+5.188

JUNE 15.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
0	18 58 30.21	2.1627	−19 21 59.5	+5.286
1	19 0 39.94	2.1616	19 16 39.4	5.385
2	19 2 49.60	2.1604	19 11 13.3	5.483
3	19 4 59.19	2.1593	19 5 41.4	5.581
4	19 7 8.72	2.1583	19 0 3.6	5.678
5	19 9 18.18	2.1570	18 54 20.0	5.775
6	19 11 27.56	2.1558	18 48 30.6	5.872
7	19 13 36.87	2.1546	18 42 35.4	5.968
8	19 15 46.11	2.1533	18 36 34.5	6.063
9	19 17 55.27	2.1521	18 30 27.9	6.158
10	19 20 4.36	2.1508	18 24 15.6	6.253
11	19 22 13.37	2.1495	18 17 57.6	6.347
12	19 24 22.30	2.1482	18 11 34.0	6.440
13	19 26 31.15	2.1469	18 5 4.8	6.533
14	19 28 39.93	2.1456	17 58 30.0	6.627
15	19 30 48.62	2.1442	17 51 49.6	6.718
16	19 32 57.23	2.1428	17 45 3.8	6.810
17	19 35 5.75	2.1414	17 38 12.4	6.902
18	19 37 14.20	2.1400	17 31 15.6	6.992
19	19 39 22.55	2.1386	17 24 13.4	7.082
20	19 41 30.83	2.1373	17 17 5.8	7.171
21	19 43 39.02	2.1358	17 9 52.9	7.259
22	19 45 47.12	2.1343	17 2 34.7	7.348
23	19 47 55.13	2.1328	16 55 11.1	7.437
24	19 50 3.06	2.1314	−16 47 42.3	+7.523

JUNE 16.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
	h m s	s	° ′ ″	″
0	19 50 3.06	2.1314	−16 47 42.3	+ 7.523
1	19 52 10.90	2.1300	16 40 8.3	7.610
2	19 54 18.66	2.1285	16 32 29.1	7.696
3	19 56 26.32	2.1271	16 24 44.8	7.782
4	19 58 33.91	2.1257	16 16 55.3	7.867
5	20 0 41.40	2.1242	16 9 0.8	7.951
6	20 2 48.81	2.1228	16 1 1.2	8.034
7	20 4 56.13	2.1213	15 52 56.7	8.117
8	20 7 3.36	2.1198	15 44 47.2	8.200
9	20 9 10.51	2.1184	15 36 32.7	8.283
10	20 11 17.57	2.1170	15 28 13.3	8.363
11	20 13 24.55	2.1156	15 19 49.1	8.443
12	20 15 31.44	2.1142	15 11 20.1	8.523
13	20 17 38.25	2.1128	15 2 46.3	8.603
14	20 19 44.97	2.1113	14 54 7.8	8.681
15	20 21 51.60	2.1099	14 45 24.6	8.759
16	20 23 58.16	2.1086	14 36 36.7	8.837
17	20 26 4.63	2.1072	14 27 44.2	8.913
18	20 28 11.02	2.1058	14 18 47.1	8.989
19	20 30 17.33	2.1045	14 9 45.5	9.065
20	20 32 23.56	2.1032	14 0 39.3	9.140
21	20 34 29.71	2.1018	13 51 28.7	9.213
22	20 36 35.78	2.1005	13 42 13.7	9.286
23	20 38 41.77	2.0993	−13 32 54.4	+ 9.358

JUNE 17.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
0	20 40 47.69	2.0980	−13 23 30.7	+ 9.431
1	20 42 53.53	2.0968	13 14 2.7	9.502
2	20 44 59.30	2.0956	13 4 30.5	9.573
3	20 47 5.00	2.0943	12 54 54.0	9.643
4	20 49 10.62	2.0932	12 45 13.4	9.711
5	20 51 16.18	2.0920	12 35 28.7	9.779
6	20 53 21.66	2.0908	12 25 39.9	9.847
7	20 55 27.08	2.0898	12 15 47.1	9.913
8	20 57 32.43	2.0887	12 5 50.3	9.980
9	20 59 37.72	2.0877	11 55 49.5	10.045
10	21 1 42.95	2.0867	11 45 44.9	10.109
11	21 3 48.12	2.0856	11 35 36.4	10.173
12	21 5 53.22	2.0846	11 25 24.1	10.237
13	21 7 58.27	2.0837	11 15 8.0	10.298
14	21 10 3.26	2.0828	11 4 48.3	10.360
15	21 12 8.20	2.0819	10 54 24.8	10.422
16	21 14 13.09	2.0810	10 43 57.7	10.481
17	21 16 17.92	2.0802	10 33 27.1	10.540
18	21 18 22.71	2.0795	10 22 52.9	10.599
19	21 20 27.46	2.0788	10 12 15.2	10.657
20	21 22 32.16	2.0780	10 1 34.1	10.713
21	21 24 36.82	2.0773	9 50 49.6	10.770
22	21 26 41.44	2.0767	9 40 1.7	10.826
23	21 28 46.02	2.0761	9 29 10.5	10.880
24	21 30 50.57	2.0756	− 9 18 16.1	+10.932

MEAN TIME.

GREENWICH MEAN TIME.

JUNE 22.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
	h m s	s	° ′ ″	″
0	0 55 8.68	2.2688	+10 4 3.6	+11.678
1	0 57 24.95	2.2736	10 15 42.9	11.630
2	0 59 41.51	2.2783	10 27 19.2	11.580
3	1 1 58.35	2.2832	10 38 52.5	11.528
4	1 4 15.49	2.2881	10 50 22.6	11.476
5	1 6 32.92	2.2930	11 1 49.6	11.423
6	1 8 50.65	2.2979	11 13 13.3	11.367
7	1 11 8.67	2.3029	11 24 33.6	11.309
8	1 13 26.99	2.3079	11 35 50.4	11.251
9	1 15 45.62	2.3130	11 47 3.7	11.191
10	1 18 4.55	2.3181	11 58 13.3	11.130
11	1 20 23.79	2.3232	12 9 19.3	11.068
12	1 22 43.33	2.3283	12 20 21.4	11.003
13	1 25 3.18	2.3335	12 31 19.6	10.938
14	1 27 23.35	2.3388	12 42 13.9	10.870
15	1 29 43.83	2.3440	12 53 4.0	10.801
16	1 32 4.63	2.3493	13 3 50.0	10.731
17	1 34 25.74	2.3545	13 14 31.7	10.659
18	1 36 47.17	2.3598	13 25 9.1	10.587
19	1 39 8.92	2.3652	13 35 42.1	10.512
20	1 41 30.99	2.3705	13 46 10.5	10.436
21	1 43 53.38	2.3758	13 56 34.4	10.358
22	1 46 16.09	2.3812	14 6 53.5	10.278
23	1 48 39.12	2.3866	+14 17 7.8	+10.198

JUNE 23.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
0	1 51 2.48	2.3921	+14 27 17.3	+10.117
1	1 53 26.17	2.3974	14 37 21.8	10.033
2	1 55 50.17	2.4028	14 47 21.2	9.947
3	1 58 14.51	2.4083	14 57 15.4	9.860
4	2 0 39.17	2.4137	15 7 4.4	9.772
5	2 3 4.15	2.4191	15 16 48.1	9.683
6	2 5 29.46	2.4246	15 26 26.4	9.592
7	2 7 55.10	2.4300	15 35 59.1	9.498
8	2 10 21.06	2.4353	15 45 26.2	9.405
9	2 12 47.34	2.4408	15 54 47.7	9.309
10	2 15 13.95	2.4463	16 4 3.3	9.212
11	2 17 40.89	2.4516	16 13 13.1	9.113
12	2 20 8.14	2.4569	16 22 16.9	9.013
13	2 22 35.72	2.4623	16 31 14.7	8.912
14	2 25 3.61	2.4676	16 40 6.3	8.808
15	2 27 31.83	2.4729	16 48 51.6	8.703
16	2 30 0.36	2.4782	16 57 30.7	8.598
17	2 32 29.21	2.4835	17 6 3.3	8.490
18	2 34 58.38	2.4888	17 14 29.5	8.381
19	2 37 27.86	2.4938	17 22 49.0	8.270
20	2 39 57.64	2.4990	17 31 1.9	8.159
21	2 42 27.74	2.5042	17 39 8.1	8.046
22	2 44 58.14	2.5093	17 47 7.4	7.930
23	2 47 28.85	2.5143	17 54 59.7	7.814
24	2 49 59.86	2.5193	+18 2 45.1	+7.697

JUNE 24.

Hour.	Right Ascension.	Var. per Min	Declination.	Var. per Min.
	h m s	s	° ′ ″	″
0	2 49 59.86	2.5193	+18 2 45.1	+7.697
1	2 52 31.17	2.5243	18 10 23.4	7.578
2	2 55 2.77	2.5292	18 17 54.4	7.458
3	2 57 34.67	2.5341	18 25 18.3	7.336
4	3 0 6.86	2.5388	18 32 34.7	7.213
5	3 2 39.33	2.5436	18 39 43.8	7.089
6	3 5 12.09	2.5483	18 46 45.4	6.963
7	3 7 45.12	2.5529	18 53 39.4	6.836
8	3 10 18.44	2.5575	19 0 25.7	6.708
9	3 12 52.02	2.5619	19 7 4.3	6.578
10	3 15 25.87	2.5663	19 13 35.1	6.448
11	3 17 59.98	2.5707	19 19 58.1	6.317
12	3 20 34.35	2.5749	19 26 13.1	6.183
13	3 23 8.97	2.5792	19 32 20.1	6.048
14	3 25 43.85	2.5833	19 38 18.9	5.913
15	3 28 18.96	2.5873	19 44 9.7	5.777
16	3 30 54.32	2.5913	19 49 52.1	5.638
17	3 33 29.91	2.5951	19 55 26.3	5.500
18	3 36 5.73	2.5988	20 0 52.1	5.360
19	3 38 41.77	2.6024	20 6 9.5	5.220
20	3 41 18.02	2.6060	20 11 18.5	5.078
21	3 43 54.49	2.6095	20 16 18.8	4.934
22	3 46 31.16	2.6129	20 21 10.6	4.791
23	3 49 8.04	2.6162	+20 25 53.7	+4.646

JUNE 25.

Hour.	Right Ascension.	Var. per Min	Declination.	Var. per Min.
0	3 51 45.10	2.6193	+20 30 28.1	+4.500
1	3 54 22.35	2.6224	20 34 53.7	4.353
2	3 56 59.79	2.6253	20 39 10.5	4.206
3	3 59 37.39	2.6281	20 43 18.4	4.057
4	4 2 15.16	2.6308	20 47 17.3	3.908
5	4 4 53.09	2.6335	20 51 7.3	3.758
6	4 7 31.18	2.6360	20 54 48.3	3.608
7	4 10 9.41	2.6383	20 58 20.2	3.456
8	4 12 47.78	2.6406	21 1 43.0	3.304
9	4 15 26.28	2.6428	21 4 56.7	3.152
10	4 18 4.91	2.6448	21 8 1.2	2.998
11	4 20 43.65	2.6466	21 10 56.5	2.844
12	4 23 22.50	2.6483	21 13 42.5	2.690
13	4 26 1.45	2.6500	21 16 19.3	2.535
14	4 28 40.50	2.6515	21 18 46.7	2.379
15	4 31 19.63	2.6528	21 21 4.8	2.224
16	4 33 58.84	2.6541	21 23 13.6	2.068
17	4 36 38.12	2.6552	21 25 13.0	1.911
18	4 39 17.46	2.6561	21 27 2.9	1.754
19	4 41 56.85	2.6569	21 28 43.5	1.598
20	4 44 36.29	2.6577	21 30 14.6	1.440
21	4 47 15.77	2.6582	21 31 36.3	1.282
22	4 49 55.27	2.6586	21 32 48.4	1.124
23	4 52 34.80	2.6589	21 33 51.2	0.967
24	4 55 14.34	2.6590	+21 34 44.4	+0.808

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11	17 39 48.08	2.1560	21 4 3.0	1.318	11	19 23 49.88	2.1703	18 2 33.3	6.201
12	17 41 57.46	2.1568	21 2 40.8	1.422	12	19 26 0.10	[illegible]	17 56 18.3	6.298
13	17 44 6.89	2.1577	21 1 12.4	1.524	13	19 28 10.31	2.1700	17 49 57.5	6.394
14	17 46 16 38	2.1584	20 59 37.9	1.627	14	19 30 20.50	2.1698	17 43 31 0	6.491
15	17 48 25 90	2.1592	20 57 57.2	1.731	15	19 32 30.69	2.1697	17 36 58.6	6.588
16	17 50 35.48	2.1600	20 56 10.2	1.834	16	19 34 40.86	2.1694	17 30 20.5	6.683
17	17 52 45.10	2.1607	20 54 17.1	1.937	17	19 36 51.02	[illegible]	17 23 36.6	6.778
18	17 54 54.76	2.1613	20 52 17.8	2.040	18	19 39 1.16	[illegible]	17 16 47.1	6.873
19	17 57 4.46	2.1620	20 50 12.3	2.143	[illegible]	19 41 11.29	2.1686	17 9 51.8	6.968
20	17 59 14.20	2.1627	20 48 0.6	2.247	20	19 43 21.41	2.1685	17 2 50 9	7.063
21	18 1 23.98	2.1633	20 45 42.7	2.349	21	19 45 31.51	2.1683	16 55 44.3	7.157
22	18 3 33.80	2.1639	20 43 18.7	2.453	22	19 47 41.60	2.1680	16 48 32.1	7.250
23	18 5 43.65	2.1644	20 40 48.4	2.557	[illegible]	19 49 51.67	2.1678	16 41 14.3	7.343
24	18 7 53.53	2.1650	−20 38 11.9	+2.660	24	19 52 1.73	2.1676	−16 33 51.0	+7.435

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GREENWICH MEAN TIME.

Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.	Hour.	Right Ascension.	Var. per Min.	Declination.	Var. per Min.
	DECEMBER 31.					DECEMBER 31.			
	h m s	s	° ′ ″	″		h m s	s	° ′ ″	″
0	1 29 1.77	2.2854	+12 1 3.8	+10.318	12	1 56 51.55	2.3534	+14 0 18.3	+9.523
1	1 31 19.06	2.2910	12 11 21.1	10.258	13	1 59 12.93	2.3593	14 9 47.4	9.448
2	1 33 36.69	2.2965	12 21 34.8	10.198	14	2 1 34.67	2.3653	14 19 12.0	9.371
3	1 35 54.64	2.3021	12 31 44.9	10.138	15	2 3 56.76	2.3710	14 28 31.9	9.293
4	1 38 12.94	2.3077	12 41 51.3	10.074	16	2 6 19.19	2.3768	14 37 47.1	9.213
5	1 40 31.56	2.3133	12 51 53.8	10.010	17	2 8 41.98	2.3828	14 46 57.5	9.132
6	1 42 50.53	2.3190	13 1 52.5	9.945	18	2 11 5.13	2.3888	14 56 2.9	9.049
7	1 45 9.84	2.3247	13 11 47.2	9.878	19	2 13 28.63	2.3946	15 5 3.4	8.966
8	1 47 29.49	2.3304	13 21 37.9	9.810	20	2 15 52.48	2.4004	15 13 58.8	8.880
9	1 49 49.49	2.3362	13 31 24.4	9.740	21	2 18 16.68	2.4063	15 22 49.0	8.793
10	1 52 9.83	2.3419	13 41 6.7	9.669	22	2 20 41.24	2.4123	15 31 34.0	8.705
11	1 54 30.52	2.3477	13 50 44.7	9.597	23	2 23 6.16	2.4183	15 40 13.6	8.615
12	1 56 51.55	2.3534	+14 0 18.3	+ 9.523	24	2 25 31.43	2.4241	+15 48 47.8	+8.524

PHASES OF THE MOON.

		d h m		d h m		d h m		d h m
● New Moon	Jan.	1 20 24.1	Mar.	31 9 4.9	June	27 8 52.6	Sept.	23 16 33.9
☽ First Quarter		8 22 55.2	Apr.	7 0 38.8	July	4 15 17.2	Oct.	1 20 37.3
○ Full Moon		15 20 44.4		14 20 25.1		12 18 2.2		9 1 38.6
☾ Last Quarter		23 16 22.0		22 23 21.1		19 23 3.0		15 17 4.7
● New Moon		31 11 7.0		29 17 30.4		26 17 21.4		23 8 39.5
☽ First Quarter	Feb.	7 6 52.3	May	6 11 33.9	Aug.	3 8 11.5		31 13 43.2
○ Full Moon		14 11 38.2		14 13 1.3		11 5 39.5	Nov.	7 11 35.2
☾ Last Quarter		22 13 47.7		22 10 3.9		18 3 56.1		14 3 40.5
● New Moon	Mar.	1 23 11.4		29 1 11.9		25 3 37.1		22 3 19.7
☽ First Quarter		8 15 14.1	June	5 0 21.9	Sept.	2 2 21.9		30 4 46.9
○ Full Moon		16 3 41.1		13 4 28.2		9 15 54.3	Dec.	6 22 3.5
☾ Last Quarter		24 8 33.9		20 17 32.9		16 9 31.7		13 18 2.4
● New Moon		31 9 4.9		27 8 52.6		23 16 33.9		21 22 55.2
☽ First Quarter	Apr.	7 0 38.8	July	4 15 17.2	Oct.	1 20 37.3		29 17 25.0

APOGEE.

	d h		d h
January	23 11.4	August	4 3.3
February	20 7.9	August	31 22.3
March	20 0.6	September	28 17.5
April	16 8.5	October	26 8.7
May	13 10.2	November	22 14.4
June	9 18.5	December	19 15.6
July	7 9.4		

PERIGEE.

	d h		d h
January	10 22.2	July	23 2.4
February	4 14.9	August	17 17.0
March	4 2.7	September	12 20.1
April	1 9.0	October	10 16.9
April	29 19.3	November	8 1.9
May	28 5.4	December	6 14.7
June	25 10.4		

GREENWICH MEAN TIME.

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GREENWICH MEAN TIME.

GREENWICH MEAN TIME

Date.		Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
		h m s	s	° ′ ″	″			″	″	h m
Jan.	1	17 10 48.22	+ 5.040	−20 19 7.3	−23.90	9.943 4525	+4397.6	3.81	10.02	22 28.9
	2	17 13 2.98	6.171	20 29 10.9	26.29	9.953 8697	4280.6	3.72	9.79	22 27.6
	3	17 15 43.57	7.194	20 40 4.2	28.06	9.963 9876	4148.8	3.63	9.56	22 26.7
	4	17 18 47.48	8.116	20 51 33.2	29.27	9.973 7762	4007.3	3.55	9.35	22 26.1
	5	17 22 12.40	8.946	21 3 25.3	29.98	9.983 2181	3860.3	3.47	9.15	22 25.9
	6	17 25 56.24	+ 9.694	−21 15 28.8	−30.24	9.992 3034	+3710.5	3.40	8.96	22 25.9
	7	17 29 57.11	10.367	21 27 33.5	30.09	0.001 0281	3560.4	3.33	8.78	22 26.2
	8	17 34 13.32	10.974	21 39 30.1	29.57	0.009 3943	3411.7	3.27	8.61	22 26.8
	9	17 38 43.38	11.521	21 51 10.2	28.72	0.017 4064	3265.6	3.21	8.45	22 27.5
	10	17 43 25.93	12.017	22 2 26.6	27.59	0.025 0721	3123.1	3.16	8.31	22 28.5
	11	17 48 19.80	+12.465	−22 13 12.7	−26.21	0.032 4006	+2984.7	3.10	8.17	22 29.6
	12	17 53 23.91	12.871	22 23 22.8	24.60	0.039 4022	2850.8	3.05	8.04	22 30.9
	13	17 58 37.33	13.241	22 32 51.7	22.78	0.046 0880	2721.5	3.01	7.92	22 32.3
	14	18 3 59.20	13.577	22 41 34.8	20.78	0.052 4693	2597.0	2.96	7.80	22 33.8
	15	18 9 28.79	13.884	22 49 28.1	18.63	0.058 5576	2477.3	2.92	7.69	22 35.5
	16	18 15 5.41	+14.164	−22 56 27.9	−16.33	0.064 3642	+2362.2	2.88	7.59	22 37.3
	17	18 20 48.47	14.420	23 2 31.0	13.91	0.069 8998	2251.6	2.84	7.49	22 39.1
	18	18 26 37.42	14.655	23 7 34.5	11.36	0.075 1755	2145.5	2.81	7.40	22 41.1
	19	18 32 31.77	14.871	23 11 35.7	8.72	0.080 2012	2043.3	2.78	7.32	22 43.1
	20	18 38 31.08	15.068	23 14 32.4	5.99	0.084 9864	1945.1	2.75	7.24	22 45.3
	21	18 44 34.93	+15.250	−23 16 22.6	− 3.18	0.089 5408	+1850.7	2.72	7.16	22 47.5
	22	18 50 42.97	15.417	23 17 4.2	− 0.28	0.093 8724	1759.7	2.69	7.09	22 49.7
	23	18 56 54.86	15.571	23 16 35.4	+ 2.68	0.097 9900	1672.0	2.67	7.02	22 52.0
	24	19 3 10.30	15.713	23 14 54.9	5.70	0.101 9005	1587.3	2.64	6.96	22 54.4
	25	19 9 28.99	15.843	23 12 1.1	8.79	0.105 6113	1505.5	2.62	6.90	22 56.8
	26	19 15 50.68	+15.963	−23 7 52.8	+11.91	0.109 1288	+1426.2	2.60	6.85	22 59.3
	27	19 22 15.14	16.074	23 2 28.9	15.09	0.112 4590	1349.3	2.58	6.79	23 1.8
	28	19 28 42.15	16.176	22 55 48.1	18.31	0.115 6073	1274.6	2.56	6.74	23 4.3
	29	19 35 11.50	16.269	22 47 49.7	21.57	0.118 5787	1201.8	2.54	6.70	23 6.9
	30	19 41 43.01	16.356	22 38 32.6	24.86	0.121 3774	1130.7	2.53	6.66	23 9.6
	31	19 48 16.51	+16.435	−22 27 56.0	+28.19	0.124 0075	+1061.2	2.51	6.61	23 12.2
Feb.	1	19 54 51.83	16.508	22 15 59.3	31.54	0.126 4724	993.1	2.50	6.58	23 14.9
	2	20 1 28.85	16.575	22 2 41.7	34.93	0.128 7753	926.1	2.48	6.54	23 17.6
	3	20 8 7.41	16.637	21 48 2.6	38.34	0.130 9182	859.9	2.47	6.51	23 20.3
	4	20 14 47.41	16.695	21 32 1.4	41.77	0.132 9035	794.5	2.46	6.48	23 23.1
	5	20 21 28.72	+16.748	−21 14 37.5	+45.22	0.134 7324	+ 729.6	2.45	6.45	23 25.8
	6	20 28 11.27	16.797	20 55 50.6	48.69	0.136 4060	665.1	2.44	6.43	23 28.6
	7	20 34 54.95	16.843	20 35 40.1	52.19	0.137 9249	600.6	2.43	6.41	23 31.4
	8	20 41 39.70	16.886	20 14 5.6	55.69	0.139 2887	535.9	2.43	6.39	23 34.3
	9	20 48 25.44	16.926	19 51 6.8	59.21	0.140 4970	470.8	2.42	6.37	23 37.1
	10	20 55 12.11	+16.964	−19 26 43.2	+62.75	0.141 5481	+ 405.1	2.41	6.35	23 40.0
	11	21 1 59.68	17.000	19 0 54.7	66.30	0.142 4408	338.5	2.41	6.34	23 42.8
	12	21 8 48.10	17.035	18 33 40.9	69.85	0.143 1717	270.4	2.40	6.33	23 45.7
	13	21 15 37.33	17.068	18 5 1.8	73.41	0.143 7377	200.9	2.40	6.32	23 48.6
	14	21 22 27.34	17.100	17 34 57.0	76.99	0.144 1347	129.7	2.40	6.32	23 51.5
	15	21 29 18.12	+17.132	−17 3 26.5	+80.55	0.144 3583	+ 56.2	2.40	6.31	23 54.4
	16	*21 36 9.65*	+17.162	−16 30 30.5	+84.12	0.144 4022	− 20.0	2.40	6.31	23 57.4

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ′ ″	″			″	″	h m
Feb.	16	21 36 9.65	+17.162	−16 30 30.5	+ 84.12	0.144 4022	− 20.0	2.40	6.31	23 57.4
	17	21 43 1.90	17.192	15 56 8.8	87.68	0.144 2601	99.0	2.40	6.31	. . . . .
	18	21 49 54.86	17.221	15 20 21.8	91.23	0.143 9241	181.5	2.40	6.32	0 0.3
	19	21 56 48.52	17.250	14 43 9.7	94.77	0.143 3857	267.8	2.40	6.33	0 3.3
	20	22 3 42.85	17.278	14 4 33.0	98.28	0.142 6351	358.5	2.41	6.34	0 6.2
	21	22 10 37.83	+17.304	−13 24 32.4	+101.77	0.141 6614	− 453.7	2.41	6.35	0 9.2
	22	22 17 33.41	17.328	12 43 8.6	105.21	0.140 4529	554.4	2.42	6.37	0 12.2
	23	22 24 29.56	17.350	12 0 22.9	108.60	0.138 9956	661.0	2.43	6.39	0 15.2
	24	22 31 26.20	17.369	11 16 16.5	111.92	0.137 2750	774.0	2.44	6.42	0 18.2
	25	22 38 23.24	17.383	10 30 51.3	115.16	0.135 2749	894.0	2.45	6.45	0 21.2
	26	22 45 20.56	+17.392	− 9 44 9.5	+118.31	0.132 9778	−1021.6	2.46	6.48	0 24.3
	27	22 52 18.01	17.393	8 56 13.6	121.33	0.130 3645	1157.5	2.48	6.52	0 27.3
	28	22 59 15.37	17.385	8 7 6.9	124.20	0.127 4147	1302.2	2.49	6.56	0 30.3
Mar.	1	23 6 12.40	17.365	7 16 53.4	126.89	0.124 1062	1456.3	2.51	6.61	0 33.3
	2	23 13 8.76	17.330	6 25 37.7	129.38	0.120 4166	1619.9	2.53	6.67	0 36.3
	3	23 20 4.09	+17.277	− 5 33 25.3	+131.61	0.116 3223	−1793.7	2.56	6.73	0 39.3
	4	23 26 57.87	17.201	4 40 22.7	133.55	0.111 7984	1977.9	2.58	6.80	0 42.3
	5	23 33 49.54	17.100	3 46 37.6	135.15	0.106 8205	2172.1	2.61	6.88	0 45.2
	6	23 40 38.41	16.967	2 52 18.5	136.37	0.101 3646	2376.2	2.65	6.97	0 48.1
	7	23 47 23.69	16.799	1 57 35.4	137.14	0.095 4073	2589.7	2.68	7.06	0 50.9
	8	23 54 4.45	+16.590	− 1 2 39.5	+137.43	0.088 9274	−2811.5	2.72	7.17	0 53.6
	9	0 0 39.63	16.334	− 0 7 43.2	137.17	0.081 9064	3040.4	2.77	7.29	0 56.3
	10	0 7 8.05	16.026	+ 0 46 59.7	136.31	0.074 3290	3274.7	2.82	7.42	0 58.8
	11	0 13 28.41	15.661	1 41 14.6	134.82	0.066 1851	3512.2	2.87	7.56	1 1.2
	12	0 19 39.31	15.236	2 34 45.7	132.66	0.057 4699	3750.4	2.93	7.71	1 3.4
	13	0 25 39.22	+14.745	+ 3 27 16.5	+129.79	0.048 1849	−3986.4	2.99	7.88	1 5.5
	14	0 31 26.56	14.189	4 18 30.1	126.22	0.038 3394	4217.1	3.06	8.06	1 7.3
	15	0 36 59.72	13.563	5 8 9.3	121.93	0.027 9498	4439.3	3.13	8.25	1 8.9
	16	0 42 17.03	12.869	5 55 57.1	116.94	0.017 0405	4649.5	3.21	8.46	1 10.2
	17	0 47 16.88	12.107	6 41 36.7	111.25	0.005 6445	4844.4	3.30	8.69	1 11.3
	18	0 51 57.66	+11.281	+ 7 24 52.1	+104.93	9.993 8019	−5021.1	3.39	8.93	1 12.0
	19	0 56 17.87	10.393	8 5 28.2	97.98	9.981 5605	5176.3	3.49	9.18	1 12.4
	20	1 0 16.09	9.449	8 43 10.6	90.46	9.968 9751	5307.4	3.59	9.45	1 12.4
	21	1 3 51.04	8.455	9 17 46.2	82.42	9.956 1065	5411.7	3.70	9.74	1 12.0
	22	1 7 1.59	7.417	9 49 3.0	73.90	9.943 0223	5486.9	3.81	10.03	1 11.2
	23	1 9 46.77	+ 6.343	+10 16 50.1	+ 64.96	9.929 7942	−5531.1	3.93	10.34	1 10.0
	24	1 12 5.82	5.241	10 40 57.9	55.64	9.916 4995	5542.2	4.05	10.67	1 8.4
	25	1 13 58.18	4.121	11 1 18.1	46.00	9.903 2194	5518.5	4.17	11.00	1 6.3
	26	1 15 23.56	2.993	11 17 43.5	36.08	9.890 0400	5458.3	4.31	11.34	1 3.7
	27	1 16 21.88	1.869	11 30 8.3	25.96	9.877 0496	5360.6	4.43	11.68	1 0.8
	28	1 16 53.41	+ 0.762	+11 38 28.3	+ 15.70	9.864 3404	−5224.0	4.57	12.03	0 57.3
	29	1 16 58.69	− 0.316	11 42 41.4	+ 5.39	9.852 0061	5048.0	4.70	12.37	0 53.5
	30	1 16 38.61	1.349	11 42 47.2	− 4.89	9.840 1418	4832.2	4.83	12.72	0 49.2
	31	1 15 54.40	2.324	11 38 48.0	15.01	9.828 8429	4577.1	4.95	13.05	0 44.5
Apr.	1	1 14 47.66	3.224	11 30 48.8	24.86	9.818 2026	4283.6	5.08	13.37	0 39.5
	2	1 13 20.35	− 4.036	+11 18 57.9	− 34.30	9.808 3110	−3953.8	5.19	13.68	0 34.1
	3	1 11 34.76	− 4.746	+11 3 26.7	− 43.19	9.799 2523	−3590.0	5.30	13.97	0 28.4

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
		h m s	s	° ′ ″	″			″	″	h m
Apr.	1	1 14 47.66	− 3.224	+11 30 48.8	−24.86	9.818 2026	−4283.6	5.08	13.37	0 39.5
	2	1 13 20.35	4.036	11 18 57.9	34.30	9.808 3110	3953.6	5.19	13.68	0 34.1
	3	1 11 34.76	4.745	11 3 26.7	43.19	9.799 2523	3590.0	5.30	13.97	0 28.4
	4	1 9 33.50	5.340	10 44 30.5	51.37	9.791 1029	3196.7	5.41	14.24	0 22.5
	5	1 7 19.43	5.811	10 22 27.9	58.70	9.783 9284	2778.2	5.49	14.47	0 16.3
	6	1 4 55.64	− 6.150	+ 9 57 41.0	−65.03	9.777 7831	−2340.1	5.57	14.68	0 10.0
	7	1 2 25.33	6.354	9 30 35.2	70.26	9.772 7062	1889.0	5.64	14.85	{ 0 3.6 23 57.1
	8	0 59 51.73	6.423	9 1 38.1	74.30	9.768 7212	1431.3	5.69	14.99	23 50.6
	9	0 57 18.06	6.361	8 31 18.9	77.09	9.765 8356	973.9	5.73	15.09	23 44.2
	10	0 54 47.40	6.174	8 0 8.1	78.61	9.764 0408	523.5	5.75	15.15	23 37.9
	11	0 52 22.65	− 5.871	+ 7 28 35.6	−78.89	9.763 3124	− 86.2	5.76	15.18	23 31.7
	12	0 50 6.42	5.465	6 57 11.1	77.97	9.763 6119	+ 332.3	5.76	15.17	23 25.7
	13	0 48 1.03	4.970	6 26 22.0	75.95	9.764 8890	727.8	5.74	15.12	23 19.9
	14	0 46 8.48	4.398	5 56 33.7	72.92	9.767 0840	1096.6	5.71	15.05	23 14.3
	15	0 44 30.40	3.766	5 28 8.6	69.03	9.770 1293	1436.1	5.67	14.94	23 9.0
	16	0 43 8.09	− 3.086	+ 5 1 26.2	−64.39	9.773 9527	+1745.0	5.62	14.81	23 4.0
	17	0 42 2.52	2.373	4 36 42.7	59.14	9.778 4804	2022.9	5.57	14.66	22 59.2
	18	0 41 14.34	1.639	4 14 11.2	53.42	9.783 6378	2269.8	5.50	14.48	22 54.8
	19	0 40 43.95	0.892	3 54 1.6	47.33	9.789 3517	2486.9	5.43	14.29	22 50.6
	20	0 40 31.52	− 0.144	3 36 21.3	41.00	9.795 5524	2675.7	5.35	14.09	22 46.8
	21	0 40 36.99	+ 0.598	+ 3 21 14.8	−34.52	9.802 1735	+2837.6	5.27	13.88	22 43.2
	22	0 41 0.15	1.329	3 8 45.1	27.96	9.809 1533	2975.2	5.19	13.66	22 39.9
	23	0 41 40.68	2.045	2 58 52.7	21.41	9.816 4364	3090.4	5.10	13.43	22 36.9
	24	0 42 38.15	2.740	2 51 37.0	14.92	9.823 9706	3185.0	5.01	13.20	22 34.2
	25	0 43 52.02	3.413	2 46 55.8	8.53	9.831 7101	3261.7	4.92	12.97	22 31.8
	26	0 45 21.77	+ 4.062	+ 2 44 46.4	− 2.28	9.839 6140	+3322.3	4.83	12.73	22 29.6
	27	0 47 6.79	4.686	2 45 5.0	+ 3.80	9.847 6459	3368.8	4.75	12.50	22 27.6
	28	0 49 6.48	5.285	2 47 47.5	9.71	9.855 7744	3403.0	4.66	12.27	22 25.9
	29	0 51 20.26	5.859	2 52 49.3	15.41	9.863 9715	3426.4	4.57	12.04	22 24.4
	30	0 53 47.54	6.410	3 0 5.5	20.91	9.872 2135	3440.5	4.48	11.81	22 23.1
May	1	0 56 27.76	+ 6.938	+ 3 9 31.2	+26.20	9.880 4795	+3446.6	4.40	11.59	22 22.0
	2	0 59 20.39	7.444	3 21 1.3	31.28	9.888 7518	3445.9	4.32	11.37	22 21.1
	3	1 2 24.93	7.931	3 34 31.0	36.15	9.897 0153	3439.4	4.24	11.16	22 20.4
	4	1 5 40.92	8.399	3 49 55.1	40.82	9.905 2571	3428.0	4.16	10.95	22 19.9
	5	1 9 7.96	8.851	4 7 8.9	45.30	9.913 4660	3412.1	4.08	10.74	22 19.6
	6	1 12 45.66	+ 9.288	+ 4 26 7.7	+49.57	9.921 6322	+3392.6	4.00	10.54	22 19.5
	7	1 16 33.67	9.712	4 46 46.6	53.64	9.929 7479	3369.9	3.93	10.35	22 19.5
	8	1 20 31.73	10.125	5 9 1.2	57.54	9.937 8054	3344.3	3.86	10.16	22 19.6
	9	1 24 39.57	10.527	5 32 47.2	61.26	9.945 7985	3316.3	3.79	9.97	22 20.0
	10	1 28 56.98	10.922	5 58 0.1	64.79	9.953 7218	3286.0	3.72	9.79	22 20.5
	11	1 33 23.79	+11.311	+ 6 24 35.8	+68.15	9.961 5696	+3253.6	3.65	9.61	22 21.1
	12	1 37 59.88	11.695	6 52 30.1	71.34	9.969 3375	3219.3	3.58	9.44	22 21.9
	13	1 42 45.14	12.076	7 21 38.9	74.36	9.977 0204	3182.8	3.52	9.28	22 22.9
	14	1 47 39.54	12.457	7 51 58.1	77.21	9.984 6136	3144.5	3.46	9.12	22 24.0
	15	1 52 43.05	12.836	8 23 23.8	79.90	9.992 1126	3104.3	3.40	8.96	22 25.2
	16	1 57 55.69	+13.218	+ 8 55 51.9	+82.42	9.999 5123	+3061.8	3.35	8.81	22 26.7
	17	*2 3 17.52*	*+13.602*	+ 9 29 18.5	+84.76	0.006 8075	+3017.1	3.29	8.66	22 28.2

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GREENWICH MEAN TIME.

Date.		Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
		h m s	s	° ′ ″	″			″	″	h m
July	1	8 6 14.49	+17.284	+22 1 43.6	−62.14	0.049 9515	−2506.5	2.98	7.84	1 32.5
	2	8 13 3.26	16.780	21 36 19.5	64.83	0.043 8664	2563.7	3.02	7.95	1 35.3
	3	8 19 39.95	16.278	21 9 54.2	67.24	0.037 6484	2617.4	3.06	8.07	1 38.0
	4	8 26 4.60	15.777	20 42 34.3	69.38	0.031 3053	2668.0	3.11	8.19	1 40.5
	5	8 32 17.25	15.278	20 14 26.2	71.26	0.024 8440	2716.0	3.16	8.31	1 42.7
	6	8 38 17.96	+14.781	+19 45 36.0	−72.89	0.018 2702	−2761.7	3.21	8.44	1 44.8
	7	8 44 6.76	14.285	19 16 9.7	74.27	0.011 5898	2805.0	3.25	8.57	1 46.6
	8	8 49 43.67	13.791	18 46 13.2	75.40	0.004 8075	2846.7	3.30	8.70	1 48.3
	9	8 55 8.72	13.297	18 15 52.2	76.31	9.997 9269	2886.8	3.36	8.84	1 49.8
	10	9 0 21.91	12.802	17 45 12.2	76.99	9.990 9524	2925.1	3.41	8.99	1 51.0
	11	9 5 23.20	+12.306	+17 14 18.7	−77.43	9.983 8878	−2961.9	3.47	9.13	1 52.1
	12	9 10 12.57	11.807	16 43 17.3	77.65	9.976 7364	2997.4	3.52	9.28	1 52.9
	13	9 14 49.92	11.305	16 12 13.2	77.65	9.969 5016	3031.4	3.58	9.44	1 53.6
	14	9 19 15.19	10.799	15 41 11.8	77.42	9.962 1868	3063.9	3.65	9.60	1 54.1
	15	9 23 28.23	10.287	15 10 18.6	76.97	9.954 7961	3094.8	3.71	9.77	1 54.3
	16	9 27 28.90	+ 9.768	+14 39 38.9	−76.29	9.947 3330	−3124.1	3.77	9.93	1 54.4
	17	9 31 17.01	9.240	14 9 18.5	75.38	9.939 8023	3151.1	3.84	10.11	1 54.2
	18	9 34 52.32	8.702	13 39 22.7	74.23	9.932 2093	3176.0	3.91	10.29	1 53.9
	19	9 38 14.59	8.152	13 9 57.5	72.83	9.924 5597	3198.2	3.98	10.47	1 53.3
	20	9 41 23.53	7.591	12 41 8.7	71.19	9.916 8606	3217.2	4.05	10.66	1 52.5
	21	9 44 18.82	+ 7.014	+12 13 2.5	−69.29	9.909 1202	−3232.5	4.12	10.85	1 51.4
	22	9 47 0.08	6.421	11 45 45.1	67.12	9.901 3481	3243.4	4.19	11.04	1 50.1
	23	9 49 26.91	5.812	11 19 23.2	64.66	9.893 5562	3249.0	4.27	11.24	1 48.6
	24	9 51 38.90	5.184	10 54 3.6	61.92	9.885 7578	3248.5	4.35	11.45	1 46.9
	25	9 53 35.59	4.537	10 29 53.5	58.88	9.877 9690	3240.9	4.43	11.66	1 44.9
	26	9 55 16.50	+ 3.869	+10 7 0.0	−55.52	9.870 2084	−3224.6	4.51	11.87	1 42.6
	27	9 56 41.14	3.181	9 45 31.1	51.84	9.862 4989	3198.4	4.59	12.08	1 40.0
	28	9 57 49.01	2.472	9 25 34.5	47.82	9.854 8654	3160.8	4.67	12.29	1 37.2
	29	9 58 39.62	1.743	9 7 18.4	43.46	9.847 3380	3109.7	4.75	12.51	1 34.1
	30	9 59 12.51	0.995	8 50 51.2	38.75	9.839 9510	3043.4	4.83	12.72	1 30.7
	31	9 59 27.26	+ 0.232	+ 8 36 21.3	−33.69	9.832 7434	−2959.9	4.91	12.93	1 27.0
Aug.	1	9 59 23.52	− 0.545	8 23 56.8	28.29	9.825 7593	2856.6	4.99	13.14	1 23.0
	2	9 59 1.03	1.330	8 13 46.1	22.55	9.819 0490	2731.6	5.07	13.35	1 18.6
	3	9 58 19.68	2.116	8 5 56.8	16.50	9.812 6668	2582.5	5.14	13.55	1 14.0
	4	9 57 19.48	2.898	8 0 36.2	10.17	9.806 6742	2406.9	5.21	13.73	1 9.1
	5	9 56 0.68	− 3.665	+ 7 57 50.4	− 3.61	9.801 1365	−2202.8	5.28	13.91	1 3.8
	6	9 54 23.76	4.407	7 57 44.6	+ 3.15	9.796 1247	1968.7	5.34	14.07	0 58.3
	7	9 52 29.46	5.111	8 0 22.5	10.01	9.791 7121	1703.0	5.40	14.22	0 52.4
	8	9 50 18.86	5.763	8 5 45.4	16.90	9.787 9759	1405.2	5.44	14.34	0 46.3
	9	9 47 53.39	6.347	8 13 53.0	23.71	9.784 9928	1075.3	5.48	14.44	0 40.0
	10	9 45 14.84	− 6.850	+ 8 24 41.9	+30.33	9.782 8392	− 714.4	5.51	14.51	0 33.4
	11	9 42 25.37	7.254	8 38 6.1	36.63	9.781 5866	− 324.9	5.52	14.55	0 26.7
	12	9 39 27.56	7.543	8 53 56.5	42.49	9.781 3003	+ 90.3	5.53	14.56	0 19.8
	13	9 36 24.30	7.706	9 12 1.0	47.78	9.782 0368	526.4	5.52	14.54	0 12.9
	14	9 33 18.79	7.729	9 32 4.4	52.38	9.783 8397	978.2	5.50	14.48	{ 0 5.9 23 58.9
	15	9 30 14.49	− 7.604	+ 9 53 49.0	+56.19	9.786 7396	+1430.3	5.46	14.38	23 52.0
	16	*9 27 15.00*	− 7.327	+10 16 54.7	+59.13	9.790 7499	+1902.4	5.41	14.25	23 45.2

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
		Noon.	*Noon.*	*Noon.*	*Noon.*	*Noon.*	*Noon.*	*Noon.*	*Noon.*	
		h m s	s	° ′ ″	″			″	″	h m
Aug.	16	9 27 15.00	− 7.327	+10 16 54.7	+ 59.13	9.790 7499	+1902.4	5.41	14.25	23 45.2
	17	9 24 24.01	6.897	10 40 59.6	61.12	9.795 8671	2360.4	5.35	14.08	23 38.6
	18	9 21 45.15	6.316	11 5 40.6	62.13	9.802 0698	2806.0	5.27	13.88	23 32.3
	19	9 19 21.97	5.592	11 30 33.9	62.15	9.809 3204	3232.4	5.18	13.65	23 26.3
	20	9 17 17.77	4.736	11 55 15.8	61.19	9.817 5646	3633.0	5.08	13.39	23 20.7
	21	9 15 35.58	− 3.761	+12 19 23.4	+ 59.29	9.826 7337	+4002.4	4.98	13.11	23 15.5
	22	9 14 18.05	2.683	12 42 34.3	56.48	9.836 7478	4336.5	4.87	12.82	23 10.7
	23	9 13 27.47	1.519	13 4 27.5	52.83	9.847 5175	4631.5	4.75	12.50	23 6.4
	24	9 13 5.69	− 0.287	13 24 43.7	48.40	9.858 9458	4885.1	4.62	12.18	23 2.6
	25	9 13 14.11	+ 0.995	13 43 5.0	43.26	9.870 9321	5096.2	4.50	11.85	22 59.3
	26	9 13 53.72	+ 2.309	+13 59 15.2	+ 37.49	9.883 3731	+5264.1	4.37	11.51	22 56.5
	27	9 15 5.06	3.638	14 13 0.0	31.15	9.896 1653	5388.9	4.25	11.18	22 54.3
	28	9 16 48.31	4.965	14 24 6.3	24.30	9.909 2061	5471.5	4.12	10.85	22 52.5
	29	9 19 3.22	6.274	14 32 22.8	17.01	9.922 3958	5513.2	3.99	10.52	22 51.3
	30	9 21 49.19	7.551	14 37 40.0	9.36	9.935 6382	5515.7	3.88	10.21	22 50.7
	31	9 25 5.32	+ 8.784	+14 39 49.7	+ 1.40	9.948 8416	+5481.1	3.76	9.90	22 50.4
Sept.	1	9 28 50.36	9.959	14 38 45.6	− 6.77	9.961 9194	5411.5	3.65	9.61	22 50.7
	2	9 33 2.79	11.065	14 34 23.3	15.11	9.974 7911	5309.8	3.54	9.33	22 51.4
	3	9 37 40.87	12.094	14 26 40.0	23.50	9.987 3830	5178.9	3.44	9.06	22 52.4
	4	9 42 42.61	13.037	14 15 35.3	31.88	9.999 6289	5022.0	3.35	8.81	22 53.9
	5	9 48 5.90	+13.888	+14 1 10.5	− 40.16	0.011 4705	+4842.5	3.25	8.57	22 55.6
	6	9 53 48.48	14.644	13 43 29.1	48.25	0.022 8577	4644.0	3.17	8.35	22 57.7
	7	9 59 48.05	15.303	13 22 36.7	56.07	0.033 7496	4430.3	3.09	8.14	22 59.9
	8	10 6 2.25	15.864	12 58 40.7	63.53	0.044 1140	4205.2	3.02	7.95	23 2.4
	9	10 12 28.78	16.331	12 31 50.3	70.59	0.053 9282	3972.3	2.95	7.77	23 5.1
	10	10 19 5.43	+16.708	+12 2 15.9	− 77.19	0.063 1775	+3735.0	2.89	7.61	23 7.9
	11	10 25 50.11	17.001	11 30 9.4	83.27	0.071 8556	3496.8	2.83	7.46	23 10.8
	12	10 32 40.86	17.216	10 55 43.2	88.82	0.079 9635	3260.2	2.78	7.32	23 13.8
	13	10 39 35.94	17.362	10 19 10.4	93.82	0.087 5079	3027.7	2.73	7.19	23 16.8
	14	10 46 33.77	17.448	9 40 44.0	98.29	0.094 5016	2801.4	2.69	7.08	23 19.9
	15	10 53 33.00	+17.480	+ 9 0 37.0	−102.21	0.100 9609	+2582.8	2.65	6.97	23 22.9
	16	11 0 32.46	17.468	8 19 2.0	105.62	0.106 9060	2373.0	2.61	6.88	23 26.0
	17	11 7 31.17	17.419	7 36 11.0	108.54	0.112 3589	2172.5	2.58	6.79	23 29.0
	18	11 14 28.34	17.341	6 52 15.6	111.00	0.117 3422	1982.1	2.55	6.72	23 32.0
	19	11 21 23.33	17.239	6 7 26.3	113.04	0.121 8810	1801.8	2.53	6.65	23 34.9
	20	11 28 15.65	+17.119	+ 5 21 52.9	−114.69	0.125 9987	+1631.3	2.50	6.58	23 37.8
	21	11 35 4.92	16.986	4 35 44.3	115.97	0.129 7192	1470.7	2.48	6.53	23 40.6
	22	11 41 50.89	16.844	3 49 8.9	116.93	0.133 0655	1319.4	2.46	6.48	23 43.4
	23	11 48 33.38	16.697	3 2 14.0	117.60	0.136 0595	1177.0	2.44	6.43	23 46.1
	24	11 55 12.31	16.547	2 15 6.2	118.01	0.138 7216	1042.8	2.43	6.39	23 48.8
	25	12 1 47.64	+16.397	+ 1 27 51.6	−118.17	0.141 0712	+ 916.5	2.42	6.36	23 51.3
	26	12 8 19.40	16.249	+ 0 40 35.5	118.13	0.143 1266	797.4	2.40	6.33	23 53.9
	27	12 14 47.64	16.105	− 0 6 37.3	117.90	0.144 9038	684.8	2.39	6.30	23 56.4
	28	12 21 12.47	15.965	0 53 42.4	117.50	0.146 4185	578.4	2.39	6.28	23 58.8
	29	12 27 34.00	15.830	1 40 36.0	116.94	0.147 6845	477.5	2.38	6.26	. . . . .
	30	12 33 52.38	+15.702	− 2 27 14.6	−116.26	0.148 7143	+ 381.5	2.37	6.25	0 1.1
Oct.	1	12 40 7.75	+15.580	− 3 13 35.8	−115.45	0.149 5193	+ 290.0	2.37	6.24	0 3.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	*Noon.*	*Noon.*	*Noon.*	*Noon.*	*Noon.*	*Noon.*	*Noon.*	
	h m s	s	° ′ ″	″			″	″	h m
Oct. 1	12 40 7.75	+15.580	− 3 13 35.3	−115.45	0.149 5193	+ 290.0	2.37	6.24	0 3.5
2	12 46 20.29	15.466	3 59 35.1	114.52	0.150 1095	202.4	2.37	6.23	0 5.7
3	12 52 30.16	15.358	4 45 11.5	113.50	0.150 4940	118.6	2.36	6.22	0 8.0
4	12 58 37.54	15.258	5 30 22.3	112.39	0.150 6814	+ 37.9	2.36	6.22	0 10.1
5	13 4 42.59	15.165	6 15 5.4	111.19	0.150 6780	− 40.1	2.36	6.22	0 12.3
6	13 10 45.51	+15.079	− 6 59 18.8	−109.92	0.150 4907	− 115.7	2.36	6.22	0 14.4
7	13 16 46.45	15.001	7 43 0.8	108.57	0.150 1244	189.2	2.37	6.23	0 16.5
8	13 22 45.59	14.929	8 26 9.8	107.17	0.149 5841	260.9	2.37	6.24	0 18.5
9	13 28 43.08	14.863	9 8 44.3	105.70	0.148 8733	331.2	2.37	6.25	0 20.5
10	13 34 39.09	14.805	9 50 42.8	104.17	0.147 9951	400.4	2.38	6.26	0 22.5
11	13 40 33.77	+14.752	−10 32 3.9	−102.58	0.146 9522	− 468.7	2.38	6.27	0 24.5
12	13 46 27.25	14.705	11 12 46.3	100.94	0.145 7459	536.4	2.39	6.29	0 26.4
13	13 52 19.68	14.664	11 52 48.8	99.26	0.144 3776	603.8	2.40	6.31	0 28.4
14	13 58 11.18	14.628	12 32 10.2	97.52	0.142 8476	671.2	2.41	6.33	0 30.3
15	14 4 1.85	14.596	13 10 49.1	95.72	0.141 1558	738.8	2.42	6.36	0 32.2
16	14 9 51.81	+14.568	−13 48 44.4	− 93.88	0.139 3017	− 806.5	2.43	6.39	0 34.1
17	14 15 41.13	14.543	14 25 54.9	91.99	0.137 2841	874.9	2.43	6.41	0 36.0
18	14 21 29.89	14.521	15 2 19.3	90.04	0.135 1014	944.2	2.45	6.45	0 37.8
19	14 27 18.16	14.501	15 37 56.4	88.04	0.132 7510	1014.6	2.46	6.48	0 39.7
20	14 33 5.97	14.483	16 12 45.0	86.00	0.130 2306	1085.9	2.48	6.52	0 41.6
21	14 38 53.36	+14.466	−16 46 43.8	− 83.89	0.127 5372	−1159.0	2.49	6.56	0 43.4
22	14 44 40.33	14.448	17 19 51.5	81.74	0.124 6662	1233.8	2.51	6.60	0 45.3
23	14 50 26.86	14.429	17 52 6.7	79.52	0.121 6145	1310.0	2.53	6.65	0 47.1
24	14 56 12.94	14.410	18 23 28.1	77.25	0.118 3766	1388.5	2.54	6.70	0 48.9
25	15 1 58.50	14.387	18 53 54.3	74.92	0.114 9477	1469.3	2.56	6.75	0 50.7
26	15 7 43.46	+14.359	−19 23 23.8	− 72.53	0.111 3217	−1552.7	2.59	6.81	0 52.6
27	15 13 27.70	14.327	19 51 55.2	70.07	0.107 4926	1638.7	2.61	6.87	0 54.3
28	15 19 11.10	14.288	20 19 26.8	67.55	0.103 4533	1727.8	2.63	6.93	0 56.1
29	15 24 53.45	14.241	20 45 57.0	64.96	0.099 1965	1820.0	2.66	7.00	0 57.9
30	15 30 34.57	14.184	21 11 24.3	62.30	0.094 7144	1915.7	2.69	7.08	0 59.6
31	15 36 14.16	+14.114	−21 35 46.9	− 59.57	0.089 9981	−2015.1	2.72	7.15	1 1.4
Nov. 1	15 41 51.92	14.030	21 59 3.0	56.76	0.085 0389	2118.3	2.75	7.23	1 3.0
2	15 47 27.49	13.931	22 21 10.7	53.87	0.079 8268	2225.7	2.78	7.32	1 4.7
3	15 53 0.44	13.812	22 42 8.2	50.91	0.074 3520	2337.4	2.81	7.41	1 6.3
4	15 58 30.27	13.670	23 1 53.5	47.86	0.068 6036	2453.7	2.85	7.51	1 7.9
5	16 3 56.40	+13.503	−23 20 24.6	− 44.72	0.062 5706	−2574.6	2.89	7.62	1 9.3
6	16 9 18.18	13.306	23 37 39.2	41.49	0.056 2418	2700.3	2.94	7.73	1 10.8
7	16 14 34.84	13.076	23 53 35.3	38.17	0.049 6053	2830.9	2.98	7.85	1 12.1
8	16 19 45.52	12.807	24 8 10.6	34.75	0.042 6495	2966.4	3.03	7.98	1 13.3
9	16 24 49.24	12.494	24 21 22.7	31.24	0.035 3627	3106.7	3.08	8.11	1 14.4
10	16 29 44.84	+12.130	−24 33 9.2	− 27.62	0.027 7339	−3251.4	3.14	8.26	1 15.4
11	16 34 31.05	11.711	24 43 27.5	23.89	0.019 7526	3400.3	3.19	8.41	1 16.2
12	16 39 6.43	11.226	24 52 14.9	20.04	0.011 4100	3552.4	3.25	8.57	1 16.9
13	16 43 29.31	10.668	24 59 28.6	16.08	0.002 6992	3706.9	3.32	8.75	1 17.3
14	16 47 37.85	10.029	25 5 5.6	11.98	9.993 6162	3862.2	3.39	8.93	1 17.5
15	16 51 29.97	+ 9.298	−25 9 2.7	− 7.75	9.984 1615	−4016.4	3.47	9.13	1 17.4
16	16 55 3.34	+ 8.465	−25 11 16.4	− 3.37	9.974 3406	−4166.6	3.55	9.34	1 17.0

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
	h m s	s	° ′ ″	″			″	″	h m
Nov. 16	16 55 3.34	+ 8.465	−25 11 16.4	− 3.37	9.974 3406	−4166.6	3.55	9.34	1 17.0
17	16 58 15.42	7.522	25 11 43.0	+ 1.18	9.964 1676	4309.5	3.63	9.56	1 16.2
18	17 1 3.40	6.456	25 10 18.2	5.91	9.953 6644	4440.6	3.72	9.79	1 15.1
19	17 3 24.25	5.260	25 6 57.7	10.84	9.942 8670	4553.8	3.81	10.04	1 13.4
20	17 5 14.78	3.927	25 1 36.2	15.99	9.931 8258	4642.4	3.91	10.30	1 11.3
21	17 6 31.65	+ 2.454	−24 54 8.3	+21.37	9.920 6104	−4697.4	4.01	10.57	1 8.6
22	17 7 11.55	+ 0.847	24 44 28.1	27.02	9.909 3136	4708.4	4.12	10.84	1 5.3
23	17 7 11.32	− 0.886	24 32 29.1	32.94	9.898 0546	4663.8	4.23	11.13	1 1.4
24	17 6 28.17	2.724	24 18 5.2	39.09	9.886 9822	4550.8	4.34	11.42	0 56.7
25	17 5 0.01	4.630	24 1 11.0	45.45	9.876 2766	4355.7	4.44	11.70	0 51.3
26	17 2 45.76	− 6.555	−23 41 42.7	+51.91	9.866 1509	−4065.8	4.55	11.98	0 45.1
27	16 59 45.75	8.431	23 19 39.7	58.31	9.856 8448	3671.2	4.65	12.24	0 38.2
28	16 56 2.10	10.178	22 55 6.3	64.40	9.848 6174	3166.4	4.73	12.47	0 30.5
29	16 51 38.99	11.704	22 28 13.7	69.84	9.841 7337	2552.5	4.81	12.67	0 22.2
30	16 46 42.82	12.917	21 59 22.2	74.24	9.836 4450	1839.6	4.87	12.82	0 13.4
Dec. 1	16 41 22.11	−13.737	−21 29 2.0	+77.17	9.832 9673	−1047.4	4.91	12.93	{ 0 4.2 23 54.7
2	16 35 47.06	14.104	20 57 53.2	78.23	9.831 4584	− 204.2	4.92	12.97	23 45.2
3	16 30 8.95	13.992	20 26 44.3	77.14	9.831 9999	+ 655.1	4.92	12.96	23 35.8
4	16 24 39.23	13.409	19 56 28.7	73.78	9.834 5857	1493.2	4.89	12.88	23 26.7
5	16 19 28.71	12.402	19 28 0.1	68.26	9.839 1224	2275.6	4.84	12.75	23 18.1
6	16 14 46.75	−11.043	−19 2 7.6	+60.83	9.845 4412	+2974.0	4.77	12.56	23 10.1
7	16 10 40.74	9.421	18 39 32.2	51.92	9.853 3142	3568.5	4.69	12.34	23 2.8
8	16 7 15.91	7.628	18 20 43.3	42.04	9.862 4796	4050.2	4.59	12.08	22 56.2
9	16 4 35.30	5.749	18 5 58.2	31.68	9.872 6637	4417.9	4.48	11.80	22 50.3
10	16 2 40.07	3.857	17 55 22.6	21.31	9.883 5995	4678.2	4.37	11.50	22 45.1
11	16 1 29.78	− 2.011	−17 48 52.2	+11.31	9.895 0416	+4841.9	4.26	11.21	22 40.7
12	16 1 2.84	− 0.251	17 46 14.8	+ 1.93	9.906 7741	4922.6	4.14	10.91	22 37.0
13	16 1 16.85	+ 1.398	17 47 12.8	− 6.62	9.918 6148	4934.4	4.03	10.61	22 33.9
14	16 2 8.95	2.921	17 51 25.1	14.25	9.930 4149	4891.0	3.92	10.33	22 31.4
15	16 3 36.02	4.313	17 58 28.9	20.91	9.942 0572	4804.7	3.82	10.06	22 29.4
16	16 5 34.93	+ 5.575	−18 8 1.0	−26.61	9.953 4517	+4686.3	3.72	9.80	22 27.9
17	16 8 2.62	6.713	18 19 38.8	31.39	9.964 5329	4544.8	3.63	9.55	22 26.8
18	16 10 56.20	7.734	18 33 0.9	35.31	9.975 2540	4387.4	3.54	9.32	22 26.1
19	16 14 13.00	8.649	18 47 47.4	38.44	9.985 5847	4220.3	3.46	9.10	22 25.8
20	16 17 50.60	9.468	19 3 40.1	40.84	9.995 5070	4047.6	3.38	8.89	22 25.7
21	16 21 46.79	+10.201	−19 20 22.7	−42.60	0.005 0118	+3873.0	3.30	8.70	22 26.0
22	16 25 59.62	10.856	19 37 40.3	43.77	0.014 0982	3699.3	3.24	8.52	22 26.5
23	16 30 27.35	11.444	19 55 19.8	44.44	0.022 7704	3528.1	3.17	8.35	22 27.2
24	16 35 8.46	11.972	20 13 9.8	44.65	0.031 0361	3360.8	3.11	8.19	22 28.2
25	16 40 1.57	12.446	20 30 59.7	44.45	0.038 9062	3198.5	3.06	8.05	22 29.3
26	16 45 5.50	+12.874	−20 48 40.5	−43.90	0.046 3933	+3041.6	3.00	7.91	22 30.6
27	16 50 19.21	13.262	21 6 4.3	43.03	0.053 5108	2890.7	2.95	7.78	22 32.0
28	16 55 41.77	13.613	21 23 3.8	41.88	0.060 2735	2745.8	2.91	7.67	22 33.5
29	17 1 12.36	13.932	21 39 32.8	40.49	0.066 6953	2606.8	2.87	7.55	22 35.2
30	17 6 50.28	14.223	21 55 25.7	38.88	0.072 7908	2473.7	2.83	7.44	22 37.0
31	17 12 34.89	+14.490	−22 10 37.6	−37.08	0.078 5737	+2346.3	2.79	7.34	22 38.9
32	17 18 25.64	. . . .	−22 25 4.0	. . .	0.084 0579	. . . .	2.75	7.25	22 40.9

FOR MEAN NOON.

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ′ ″	° ′ ″	′ ″	° ′ ″	′ ″		
eb.	16	307 15 8.4	3 20 7.9	+ 4 26.3	−6 53 43.2	− 4 15.5	9.629 0623	−46145
	17	310 37 28.9	3 24 36.4	2 59.6	6 57 18.7	2 54.6	9.624 3162	48770
	18	314 4 27.8	3 29 24.7	+ 1 28.4	6 59 30.3	− 1 27.5	9.619 3097	51352
	19	317 36 25.2	3 34 33.5	− 0 6.3	7 0 11.4	+ 0 6.4	9.614 0478	53875
	20	321 13 41.9	3 40 3.5	1 43.2	6 59 15.1	1 47.4	9.608 5373	56321
	21	324 56 39.4	3 45 55.1	− 3 21.0	−6 56 34.0	+ 3 36.1	9.602 7870	−58665
	22	328 45 39.6	3 52 9.0	4 57.9	6 52 0.1	5 33.1	9.596 8086	60881
	23	332 41 5.0	3 58 45.5	6 32.1	6 45 25.1	7 38.3	9.590 6162	62936
	24	336 43 18.1	4 5 44.4	8 1.4	6 36 40.6	9 52.1	9.584 2279	64794
	25	340 52 41.2	4 13 5.6	9 23.5	6 25 38.0	12 14.6	9.577 6653	66415
	26	345 9 36.6	4 20 48.7	−10 35.7	−6 12 8.5	+14 45.7	9.570 9546	−67744
	27	349 34 25.4	4 28 52.3	11 35.4	5 56 3.9	17 24.8	9.564 1281	68724
	28	354 7 27.6	4 37 15.1	12 19.7	5 37 16.6	20 11.0	9.557 2233	69299
lar.	1	358 49 1.3	4 45 54.8	12 46.0	5 15 40.0	23 3.1	9.550 2840	69401
	2	3 39 21.8	4 54 48.1	12 51.7	4 51 9.1	25 59.2	9.543 3612	68957
	3	8 38 40.8	5 3 51.2	−12 34.5	−4 23 41.1	+28 56.9	9.536 5131	−67896
	4	13 47 5.9	5 12 59.2	11 52.9	3 53 15.9	31 52.9	9.529 8051	66141
	5	19 4 38.7	5 22 5.7	10 46.0	3 19 57.2	34 43.2	9.523 3100	63630
	6	24 31 14.4	5 31 3.7	9 14.2	2 43 52.8	37 23.4	9.517 1063	60303
	7	30 6 40.4	5 39 44.8	7 19.1	2 5 15.5	39 48.1	9.511 2781	56116
	8	35 50 35.2	5 47 59.6	− 5 3.6	−1 24 23.6	+41 51.6	9.505 9124	−51051
	9	41 42 27.5	5 55 38.0	− 2 32.3	−0 41 41.3	43 28.0	9.501 0971	45111
	10	47 41 35.6	6 2 29.5	+ 0 8.6	+0 2 21.5	44 31.7	9.496 9178	38342
	11	53 47 7.3	6 8 23.5	2 52.0	0 47 9.5	44 57.7	9.493 4538	30820
	12	59 57 59.9	6 13 9.6	5 29.8	1 32 3.1	44 42.3	9.490 7754	22653
	13	66 13 0.9	6 16 39.0	+ 7 53.5	+2 16 19.5	+43 43.2	9.488 9394	−14000
	14	72 30 49.9	6 18 44.5	9 55.5	2 59 14.8	42 0.2	9.487 9858	− 5034
	15	78 50 0.3	6 19 21.1	11 28.8	3 40 5.8	39 35.2	9.487 9364	+ 4046
	16	85 9 1.8	6 18 26.7	12 28.6	4 18 12.5	36 32.3	9.488 7920	13033
	17	91 26 23.6	6 16 2.1	12 52.0	4 52 59.6	32 57.1	9.490 5333	21731
	18	97 40 37.0	6 12 10.7	+12 38.6	+5 23 58.2	+28 56.6	9.493 1224	+29958
	19	103 50 18.4	6 6 59.5	11 50.3	5 50 47.0	24 38.8	9.496 5039	37558
	20	109 54 12.2	6 0 37.0	10 30.8	6 13 12.7	20 11.7	9.500 6092	44416
	21	115 51 12.1	5 53 13.5	8 45.7	6 31 9.8	15 42.7	9.505 3594	50446
	22	121 40 22.7	5 45 0.4	6 41.1	6 44 39.8	11 18.6	9.510 6693	55606
	23	127 21 0.3	5 36 9.4	+ 4 23.8	+6 53 50.6	+ 7 5.0	9.516 4513	+59888
	24	132 52 32.6	5 26 51.7	+ 2 0.3	6 58 54.8	+ 3 6.1	9.522 6181	63307
	25	138 14 38.3	5 17 17.9	− 0 23.4	7 0 8.8	− 0 35.0	9.529 0853	65906
	26	143 27 6.2	5 7 37.5	2 42.0	6 57 51.3	3 56.6	9.535 7737	67737
	27	148 29 53.8	4 57 58.6	4 51.4	6 52 22.5	6 57.7	9.542 6095	68871
	28	153 23 6.1	4 48 28.0	− 6 48.2	+6 44 2.8	− 9 38.4	9.549 5271	+69380
	29	158 6 54.3	4 39 11.2	8 30.1	6 33 12.4	11 59.2	9.556 4671	69335
	30	162 41 34.6	4 30 12.7	9 55.7	6 20 10.6	14 1.4	9.563 3781	68809
	31	167 7 26.7	4 21 35.3	11 4.2	6 5 15.5	15 46.0	9.570 2151	67868
pr.	1	171 24 53.1	4 13 21.4	11 55.5	5 48 44.0	17 14.5	9.576 9399	66574
	2	175 34 17.9	4 5 32.5	−12 30.0	+5 30 51.2	−18 28.8	9.583 5200	+64984
	3	179 36 6.7	3 58 9.3	−12 48.4	+5 11 50.7	−19 30.1	9.589 9286	+63150

FOR MEAN NOON.

FOR MEAN NOON.

FOR MEAN NOON.

FOR MEAN NOON.

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ′ ″	° ′ ″	′ ″	° ′ ″	′ ″		
Oct.	1	198 19 11.4	3 27 17.1	−10 57.1	+3 24 52.8	−22 10.7	9.619 0574	+51473
	2	201 44 0.2	3 22 24.1	10 4.1	3 2 36.5	22 21.0	9.624 0763	48895
	3	205 4 7.0	3 17 53.1	9 3.9	2 40 12.4	22 26.4	9.628 8349	46273
	4	208 19 53.5	3 13 43.3	7 57.9	2 17 45.1	22 27.5	9.633 3299	43623
	5	211 31 40.3	3 9 53.6	6 47.2	1 55 18.7	22 24.8	9.637 5587	40949
	6	214 39 47.2	3 6 23.3	− 5 32.8	+1 32 56.5	−22 19.1	9.641 5194	+38264
	7	217 44 33.1	3 3 11.4	4 15.8	1 10 41.4	22 10.6	9.645 2115	35579
	8	220 46 15.8	3 0 17.0	2 57.2	0 48 36.1	21 59.7	9.648 6351	32892
	9	223 45 12.8	2 57 39.6	1 37.9	0 26 42.7	21 46.8	9.651 7899	30207
	10	226 41 40.3	2 55 18.2	− 0 18.5	+0 5 3.2	21 31.9	9.654 6767	27530
	11	229 35 54.3	2 53 12.4	+ 1 0.0	−0 16 20.6	−21 15.6	9.657 2962	+24862
	12	232 28 9.8	2 51 21.2	2 17.0	0 37 27.5	20 57.9	9.659 6495	22206
	13	235 18 41.5	2 49 44.5	3 31.8	0 58 15.9	20 38.7	9.661 7376	19558
	14	238 7 43.5	2 48 21.8	4 44.0	1 18 44.6	20 18.5	9.663 5613	16918
	15	240 55 29.6	2 47 12.5	5 52.9	1 38 52.5	19 57.1	9.665 1216	14290
	16	243 42 12.9	2 46 16.3	+ 6 57.9	−1 58 38.5	−19 34.7	9.666 4195	+11669
	17	246 28 6.5	2 45 33.1	7 58.8	2 18 1.6	19 11.2	9.667 4557	9055
	18	249 13 23.2	2 45 2.3	8 54.9	2 37 0.6	18 46.7	9.668 2308	6448
	19	251 58 15.3	2 44 44.0	9 45.9	2 55 34.7	18 21.2	9.668 7455	3846
	20	254 42 55.4	2 44 38.1	10 31.4	3 13 42.6	17 54.5	9.669 0000	+ 1246
	21	257 27 35.6	2 44 44.3	+11 11.2	−3 31 23.3	−17 26.7	9.668 9946	− 1355
	22	260 12 28.1	2 45 2.8	11 44.7	3 48 35.6	16 57.7	9.668 7290	3957
	23	262 57 45.2	2 45 33.5	12 11.8	4 5 18.3	16 27.3	9.668 2032	6559
	24	265 43 39.1	2 46 16.4	12 32.2	4 21 29.8	15 55.5	9.667 4170	9166
	25	268 30 22.1	2 47 11.8	12 45.7	4 37 8.9	15 22.3	9.666 3698	11780
	26	271 18 6.9	2 48 19.8	+12 51.9	−4 52 13.8	−14 47.2	9.665 0608	−14401
	27	274 7 6.0	2 49 40.6	12 50.7	5 6 42.7	14 10.2	9.663 4894	17029
	28	276 57 32.5	2 51 14.6	12 42.0	5 20 33.6	13 31.3	9.661 6546	19669
	29	279 49 39.7	2 53 2.0	12 25.7	5 33 44.5	12 50.0	9.659 5554	22316
	30	282 43 41.1	2 55 3.2	12 1.5	5 46 12.8	12 6.2	9.657 1910	24975
	31	285 39 50.9	2 57 18.7	+11 29.6	−5 57 56.0	−11 19.7	9.654 5601	−27644
Nov.	1	288 38 23.4	2 59 48.9	10 49.9	6 8 51.1	10 30.0	9.651 6619	30321
	2	291 39 33.8	3 2 34.4	10 2.5	6 18 54.8	9 36.9	9.648 4957	33003
	3	294 43 37.4	3 5 35.6	9 7.6	6 28 3.7	8 40.2	9.645 0611	35692
	4	297 50 50.5	3 8 53.3	8 5.3	6 36 13.8	7 39.3	9.641 3573	38381
	5	301 1 29.8	3 12 28.2	+ 6 56.1	−6 43 20.9	− 6 34.0	9.637 3851	−41063
	6	304 15 52.8	3 16 20.8	5 40.2	6 49 20.2	5 23.8	9.633 1451	43734
	7	307 34 17.5	3 20 31.8	4 18.4	6 54 6.7	4 8.2	9.628 6390	46385
	8	310 57 2.8	3 25 2.0	2 51.3	6 57 34.6	2 46.7	9.623 8691	49005
	9	314 24 28.2	3 29 52.1	+ 1 19.7	6 59 38.1	− 1 19.2	9.618 8395	51580
	10	317 56 53.9	3 35 2.8	− 0 15.2	−7 0 10.5	+ 0 15.4	9.613 5550	−54098
	11	321 34 40.9	3 40 34.7	1 52.3	6 59 4.8	1 57.2	9.608 0226	56534
	12	325 18 10.6	3 46 28.4	3 30.1	6 56 13.5	3 46.7	9.602 2516	58867
	13	329 7 45.1	3 52 44.3	5 6.8	6 51 28.7	5 44.3	9.596 2534	61072
	14	333 3 46.7	3 59 22.7	6 40.7	6 44 42.1	7 50.3	9.590 0427	63110
	15	337 6 38.0	4 6 23.7	− 8 9.4	−6 35 45.2	+10 4.9	9.583 6380	−64949
	16	341 16 41.5	4 13 47.0	− 9 30.6	−6 24 29.3	+12 28.3	9.577 0611	−66543

FOR MEAN NOON.

GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
	h m s	s	° ′ ″	″			″	″	h m
ay 17	6 24 1.66	+12.697	+25 34 28.0	− 3.89	0.034 9956	−1216.7	7.89	8.12	2 47.6
18	6 29 6.04	12.667	25 32 34.1	5.60	0.032 0592	1230.3	7.94	8.17	2 48.8
19	6 34 9.67	12.634	25 29 59.4	7.29	0.029 0899	1244.1	8.00	8.23	2 49.9
20	6 39 12.47	12.599	25 26 44.0	8.98	0.026 0873	1258.1	8.05	8.29	2 51.0
21	6 44 14.38	12.560	25 22 48.3	10.66	0.023 0510	1272.2	8.11	8.35	2 52.1
22	6 49 15.33	+12.519	+25 18 12.5	−12.32	0.019 9808	−1286.4	8.16	8.40	2 53.1
23	6 54 15.27	12.475	25 12 56.9	13.98	0.016 8762	1300.8	8.22	8.46	2 54.2
24	6 59 14.13	12.429	25 7 1.8	15.61	0.013 7368	1315.4	8.29	8.53	2 55.2
25	7 4 11.85	12.380	25 0 27.7	17.23	0.010 5620	1330.2	8.35	8.59	2 56.2
26	7 9 8.37	12.329	24 53 14.8	18.84	0.007 3515	1345.2	8.40	8.65	2 57.2
27	7 14 3.63	+12.276	+24 45 23.7	−20.42	0.004 1047	−1360.5	8.47	8.72	2 58.2
28	7 18 57.58	12.219	24 36 54.8	21.98	0.000 8210	1375.9	8.53	8.78	2 59.2
29	7 23 50.14	12.161	24 27 48.6	23.53	9.997 5000	1391.6	8.60	8.85	3 0.1
30	7 28 41.27	12.100	24 18 5.5	25.06	9.994 1410	1407.5	8.67	8.92	3 1.0
31	7 33 30.91	12.036	24 7 46.1	26.56	9.990 7437	1423.6	8.73	8.99	3 1.9
ıne 1	7 38 18.99	+11.970	+23 56 51.0	−28.03	9.987 3075	−1439.9	8.80	9.06	3 2.8
2	7 43 5.46	11.902	23 45 20.7	29.49	9.983 8322	1456.3	8.87	9.13	3 3.6
3	7 47 50.27	11.832	23 33 15.9	30.91	9.980 3172	1472.9	8.95	9.21	3 4.4
4	7 52 33.37	11.759	23 20 37.1	32.31	9.976 7621	1489.7	9.02	9.28	3 5.2
5	7 57 14.71	11.685	23 7 25.0	33.69	9.973 1667	1506.5	9.09	9.36	3 5.9
6	8 1 54.25	+11.609	+22 53 40.2	−35.04	9.969 5306	−1523.6	9.17	9.44	3 6.6
7	8 6 31.94	11.531	22 39 23.4	36.36	9.965 8534	1540.8	9.25	9.52	3 7.3
8	8 11 7.74	11.452	22 24 35.2	37.65	9.962 1348	1558.1	9.33	9.60	3 7.9
9	8 15 41.61	11.370	22 9 16.4	38.91	9.958 3745	1575.5	9.41	9.69	3 8.6
10	8 20 13.51	11.288	21 53 27.5	40.15	9.954 5721	1593.1	9.49	9.77	3 9.2
11	8 24 43.41	+11.204	+21 37 9.3	−41.36	9.950 7273	−1610.9	9.58	9.86	3 9.7
12	8 29 11.28	11.118	21 20 22.5	42.54	9.946 8398	1628.8	9.67	9.95	3 10.2
13	8 33 37.08	11.032	21 3 7.8	43.68	9.942 9091	1646.8	9.75	10.04	3 10.7
14	8 38 0.80	10.944	20 45 25.9	44.80	9.938 9350	1665.0	9.84	10.13	3 11.1
15	8 42 22.40	10.856	20 27 17.5	45.89	9.934 9169	1683.4	9.93	10.22	3 11.6
16	8 46 41.86	+10.766	+20 8 43.4	−46.95	9.930 8545	−1702.0	10.03	10.32	3 11.9
17	8 50 59.16	10.676	19 49 44.3	47.97	9.926 7474	1720.7	10.12	10.42	3 12.3
18	8 55 14.28	10.584	19 30 20.9	48.97	9.922 5952	1739.5	10.22	10.52	3 12.6
19	8 59 27.19	10.492	19 10 34.0	49.94	9.918 3974	1758.7	10.32	10.62	3 12.9
20	9 3 37.88	10.399	18 50 24.2	50.87	9.914 1534	1778.0	10.42	10.72	3 13.1
21	9 7 46.33	+10.305	+18 29 52.4	−51.78	9.909 8626	−1797.6	10.52	10.83	3 13.3
22	9 11 52.53	10.211	18 8 59.2	52.65	9.905 5245	1817.5	10.63	10.94	3 13.4
23	9 15 56.46	10.116	17 47 45.5	53.49	9.901 1384	1837.6	10.74	11.05	3 13.5
24	9 19 58.09	10.020	17 26 12.0	54.29	9.896 7036	1858.1	10.84	11.16	3 13.6
25	9 23 57.41	9.923	17 4 19.6	55.07	9.892 2194	1878.8	10.96	11.28	3 13.6
26	9 27 54.40	+ 9.826	+16 42 8.9	−55.81	9.887 6850	−1899.9	11.08	11.40	3 13.6
27	9 31 49.03	9.727	16 19 40.8	56.52	9.883 0997	1921.2	11.19	11.52	3 13.6
28	9 35 41.29	9.628	15 56 56.1	57.20	9.878 4628	1942.9	11.31	11.64	3 13.5
29	9 39 31.14	9.526	15 33 55.6	57.84	9.873 7736	1964.8	11.44	11.77	3 13.4
30	9 43 18.55	9.424	15 10 40.2	58.44	9.869 0314	1987.1	11.56	11.90	3 13.2
uly 1	9 47 3.50	+ 9.321	+14 47 10.6	−59.01	9.864 2355	−2009.5	11.69	12.03	3 13.0
2	9 50 45.96	+ 9.217	+14 23 27.8	−59.55	9.859 3855	−2032.2	11.81	12.16	3 12.8

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Semi-diameter.	Hor. Parallax.	Transit. Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ′ ″	″			″	″	h m
July 1	9 47 3.50	+9.321	+14 47 10.6	−59.01	9.864 2355	−2009.5	11.69	12.03	3 13.0
2	9 50 45.96	9.217	14 23 27.8	59.55	9.859 3855	2032.2	11.81	12.16	3 12.8
3	9 54 25.90	9.111	13 59 32.5	60.05	9.854 4807	2055.1	11.95	12.30	3 12.5
4	9 58 3.28	9.004	13 35 25.6	60.52	9.849 5207	2078.2	12.09	12.44	3 12.2
5	10 1 38.08	8.896	13 11 7.9	60.95	9.844 5051	2101.5	12.23	12.59	3 11.8
6	10 5 10.26	+8.786	+12 46 40.2	−61.35	9.839 4333	−2125.0	12.38	12.74	3 11.4
7	10 8 39.78	8.675	12 22 3.4	61.71	9.834 3050	2148.6	12.52	12.89	3 11.0
8	10 12 6.61	8.561	11 57 18.3	62.04	9.829 1197	2172.4	12.67	13.04	3 10.5
9	10 15 30.71	8.447	11 32 25.7	62.34	9.823 8772	2196.4	12.83	13.20	3 9.9
10	10 18 52.04	8.331	11 7 26.4	62.60	9.818 5770	2220.5	12.98	13.36	3 9.3
11	10 22 10.57	+8.213	+10 42 21.3	−62.82	9.813 2188	−2244.7	13.15	13.53	3 8.7
12	10 25 26.25	8.093	10 17 11.3	63.02	9.807 8025	2269.0	13.31	13.70	3 8.0
13	10 28 39.03	7.972	9 51 57.1	63.16	9.802 3277	2293.4	13.48	13.87	3 7.3
14	10 31 48.88	7.849	9 26 39.7	63.28	9.796 7943	2317.8	13.65	14.05	3 6.5
15	10 34 55.74	7.723	9 1 19.7	63.37	9.791 2020	2342.4	13.83	14.23	3 5.7
16	10 37 59.56	+7.595	+ 8 35 58.2	−63.42	9.785 5506	−2367.1	14.01	14.42	3 4.8
17	10 41 0.28	7.465	8 10 35.9	63.43	9.779 8400	2391.8	14.20	14.61	3 3.8
18	10 43 57.86	7.333	7 45 13.8	63.41	9.774 0700	2416.6	14.39	14.81	3 2.8
19	10 46 52.23	7.198	7 19 52.7	63.35	9.768 2404	2441.5	14.58	15.01	3 1.8
20	10 49 43.32	7.060	6 54 33.4	63.25	9.762 3510	2466.4	14.78	15.21	3 0.7
21	10 52 31.08	+6.919	+ 6 29 17.0	−63.11	9.756 4018	−2491.3	14.98	15.42	2 59.6
22	10 55 15.42	6.775	6 4 4.3	62.94	9.750 3925	2516.4	15.19	15.63	2 58.4
23	10 57 56.27	6.628	5 38 56.4	62.72	9.744 3230	2541.5	15.40	15.85	2 57.1
24	11 0 33.53	6.477	5 13 54.2	62.46	9.738 1932	2566.6	15.62	16.08	2 55.8
25	11 3 7.12	6.322	4 48 58.8	62.15	9.732 0033	2591.7	15.85	16.31	2 54.4
26	11 5 36.93	+6.162	+ 4 24 11.2	−61.80	9.725 7533	−2616.7	16.08	16.55	2 52.9
27	11 8 2.86	5.998	3 59 32.6	61.41	9.719 4435	2641.5	16.31	16.79	2 51.4
28	11 10 24.77	5.828	3 35 4.1	60.96	9.713 0744	2666.1	16.56	17.04	2 49.8
29	11 12 42.55	5.653	3 10 47.0	60.46	9.706 6467	2690.3	16.80	17.29	2 48.1
30	11 14 56.07	5.472	2 46 42.5	59.91	9.700 1613	2714.1	17.05	17.55	2 46.4
31	11 17 5.18	+5.286	+ 2 22 51.9	−59.30	9.693 6194	−2737.3	17.31	17.82	2 44.6
Aug. 1	11 19 9.75	5.094	1 59 16.4	58.64	9.687 0226	2759.9	17.58	18.09	2 42.7
2	11 21 9.62	4.894	1 35 57.5	57.92	9.680 3725	2781.7	17.85	18.37	2 40.8
3	11 23 4.63	4.688	1 12 56.5	57.15	9.673 6712	2802.6	18.13	18.66	2 38.8
4	11 24 54.61	4.476	0 50 14.9	56.31	9.666 9210	2822.4	18.41	18.95	2 36.7
5	11 26 39.40	+4.256	+ 0 27 54.2	−55.40	9.660 1247	−2841.0	18.70	19.25	2 34.5
6	11 28 18.83	4.029	+ 0 5 56.0	54.43	9.653 2855	2858.2	18.99	19.55	2 32.2
7	11 29 52.72	3.794	− 0 15 38.1	53.40	9.646 4068	2873.8	19.30	19.86	2 29.8
8	11 31 20.87	3.551	0 36 46.4	52.29	9.639 4926	2887.7	19.61	20.18	2 27.3
9	11 32 43.11	3.301	0 57 27.2	51.10	9.632 5475	2899.6	19.93	20.51	2 24.7
10	11 33 59.25	+3.043	− 1 17 38.6	−49.84	9.625 5764	−2909.3	20.25	20.84	2 22.0
11	11 35 9.09	2.776	1 37 18.8	48.50	9.618 5847	2916.7	20.58	21.18	2 19.2
12	11 36 12.44	2.502	1 56 25.8	47.08	9.611 5786	2921.3	20.91	21.52	2 16.3
13	11 37 9.12	2.220	2 14 57.5	45.56	9.604 5648	2923.0	21.25	21.87	2 13.4
14	11 37 58.94	1.930	2 32 52.0	43.97	9.597 5506	2921.6	21.60	22.23	2 10.3
15	11 38 41.71	+1.633	− 2 50 7.1	−42.28	9.590 5437	−2916.9	21.95	22.59	2 7.0
16	11 39 17.25	+1.328	− 3 6 40.6	−40.50	9.583 5526	−2908.4	22.31	22.96	2 3.7

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
	h m s	s	° ′ ″	″			″	″	h m
Oct. 1	10 41 18.60	−0.344	+1 24 59.5	+34.74	9.512 3646	+2441.8	26.28	27.05	22 0.9
2	10 41 14.92	+0.037	1 38 30.8	32.85	9.518 3048	2507.1	25.92	26.68	21 57.1
3	10 41 20.35	0.415	1 51 15.7	30.88	9.524 3930	2565.2	25.56	26.31	21 53.4
4	10 41 34.78	0.787	2 3 12.4	28.84	9.530 6121	2616.3	25.19	25.93	21 49.8
5	10 41 58.07	1.153	2 14 19.6	26.74	9.536 9462	2661.0	24.83	25.56	21 46.4
6	10 42 30.06	+1.512	+2 24 36.0	+24.61	9.543 3799	+2699.4	24.46	25.18	21 43.1
7	10 43 10.57	1.863	2 34 0.8	22.44	9.549 8987	2731.9	24.11	24.81	21 40.0
8	10 43 59.43	2.207	2 42 33.1	20.25	9.556 4888	2758.9	23.74	24.43	21 37.0
9	10 44 56.43	2.541	2 50 12.5	18.04	9.563 1373	2780.7	23.38	24.06	21 34.1
10	10 46 1.33	2.866	2 56 58.8	15.82	9.569 8322	2797.6	23.02	23.69	21 31.4
11	10 47 13.93	+3.182	+3 2 51.9	+13.60	9.576 5622	+2810.1	22.67	23.33	21 28.8
12	10 48 33.98	3.488	3 7 51.8	11.39	9.583 3171	2818.3	22.32	22.97	21 26.3
13	10 50 1.26	3.783	3 11 58.8	9.19	9.590 0870	2822.6	21.97	22.61	21 23.9
14	10 51 35.50	4.068	3 15 13.3	7.02	9.596 8629	2823.4	21.63	22.26	21 21.6
15	10 53 16.45	4.343	3 17 35.9	4.87	9.603 6366	2820.9	21.30	21.92	21 19.5
16	10 55 3.87	+4.607	+3 19 7.1	+ 2.74	9.610 4010	+2815.6	20.97	21.58	21 17.4
17	10 56 57.50	4.861	3 19 47.7	+ 0.65	9.617 1495	2807.7	20.65	21.25	21 15.5
18	10 58 57.10	5.104	3 19 38.5	− 1.41	9.623 8763	2797.6	20.33	20.92	21 13.6
19	11 1 2.42	5.338	3 18 40.2	3.44	9.630 5761	2785.3	20.01	20.60	21 11.8
20	11 3 13.23	5.562	3 16 53.8	5.42	9.637 2442	2771.3	19.71	20.29	21 10.1
21	11 5 29.30	+5.776	+3 14 20.2	− 7.37	9.643 8771	+2755.7	19.41	19.98	21 8.5
22	11 7 50.40	5.981	3 11 0.2	9.28	9.650 4704	2738.6	19.12	19.68	21 7.0
23	11 10 16.33	6.178	3 6 54.9	11.15	9.657 0216	2720.4	18.83	19.38	21 5.6
24	11 12 46.87	6.366	3 2 5.2	12.98	9.663 5279	2701.3	18.56	19.10	21 4.2
25	11 15 21.82	6.546	2 56 32.1	14.77	9.669 9871	2681.2	18.28	18.81	21 2.9
26	11 18 1.00	+6.718	+2 50 16.6	−16.52	9.676 3971	+2660.3	18.01	18.54	21 1.7
27	11 20 44.23	6.883	2 43 19.6	18.22	9.682 7562	2638.8	17.75	18.27	21 0.5
28	11 23 31.35	7.042	2 35 42.2	19.89	9.689 0628	2616.7	17.50	18.01	20 59.4
29	11 26 22.18	7.193	2 27 25.3	21.52	9.695 3160	2594.2	17.25	17.75	20 58.4
30	11 29 16.57	7.338	2 18 29.8	23.10	9.701 5146	2571.3	17.00	17.50	20 57.4
31	11 32 14.38	+7.478	+2 8 56.8	−24.64	9.707 6579	+2548.1	16.76	17.25	20 56.5
Nov. 1	11 35 15.46	7.611	1 58 47.3	26.14	9.713 7451	2524.6	16.53	17.01	20 55.6
2	11 38 19.68	7.740	1 48 2.2	27.61	9.719 7757	2500.9	16.30	16.78	20 54.8
3	11 41 26.92	7.863	1 36 42.5	29.03	9.725 7494	2477.1	16.08	16.55	20 54.0
4	11 44 37.07	7.982	1 24 49.0	30.42	9.731 6658	2453.2	15.86	16.32	20 53.3
5	11 47 50.01	+8.096	+1 12 22.8	−31.76	9.737 5246	+2429.2	15.65	16.11	20 52.6
6	11 51 5.65	8.207	0 59 24.7	33.07	9.743 3258	2405.1	15.44	15.89	20 51.9
7	11 54 23.89	8.313	0 45 55.9	34.33	9.749 0690	2380.9	15.23	15.68	20 51.3
8	11 57 44.64	8.415	0 31 57.2	35.55	9.754 7541	2356.7	15.04	15.48	20 50.8
9	12 1 7.80	8.515	0 17 29.8	36.73	9.760 3809	2332.3	14.85	15.28	20 50.3
10	12 4 33.31	+8.610	+0 2 34.4	−37.88	9.765 9492	+2308.0	14.65	15.08	20 49.8
11	12 8 1.07	8.703	−0 12 48.0	38.98	9.771 4591	2283.6	14.47	14.89	20 49.3
12	12 11 31.02	8.792	0 28 36.2	40.03	9.776 9105	2259.3	14.29	14.71	20 48.9
13	12 15 3.06	8.878	0 44 49.2	41.05	9.782 3036	2234.9	14.12	14.53	20 48.5
14	12 18 37.14	8.961	1 1 26.1	42.02	9.787 6383	2210.7	13.94	14.35	20 48.2
15	12 22 13.18	+9.042	−1 18 25.9	−42.95	9.792 9151	+2186.6	13.78	14.18	20 47.9
16	*12 25 51.12*	*+9.120*	−1 35 47.6	−43.85	9.798 1343	+2162.7	13.61	14.01	20 47.6

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
	h m s	s	° ′ ″	″			″	″	h m
ov. 16	12 25 51.12	+ 9.120	− 1 35 47.6	−43.85	9.798 1343	+2162.7	13.61	14.01	20 47.6
17	12 29 30.90	9.195	1 53 30.2	44.69	9.803 2963	2139.0	13.45	13.84	20 47.3
18	12 33 12.45	9.268	2 11 32.5	45.50	9.808 4016	2115.5	13.29	13.68	20 47.1
19	12 36 55.74	9.339	2 29 53.7	46.27	9.813 4507	2092.2	13.14	13.52	20 46.9
20	12 40 40.71	9.408	2 48 32.9	46.99	9.818 4443	2069.2	12.99	13.37	20 46.7
21	12 44 27.31	+ 9.475	− 3 7 29.0	−47.68	9.823 3829	+2046.4	12.84	13.22	20 46.6
22	12 48 15.51	9.541	3 26 41.0	48.32	9.828 2671	2023.9	12.70	13.07	20 46.5
23	12 52 5.27	9.605	3 46 8.0	48.93	9.833 0978	2001.7	12.55	12.92	20 46.4
24	12 55 56.56	9.669	4 5 49.1	49.49	9.837 8757	1979.9	12.42	12.78	20 46.3
25	12 59 49.35	9.730	4 25 43.3	50.02	9.842 6015	1958.3	12.28	12.64	20 46.3
26	13 3 43.61	+ 9.791	− 4 45 49.6	−50.50	9.847 2760	+1937.1	12.15	12.51	20 46.3
27	13 7 39.33	9.851	5 6 7.2	50.95	9.851 8999	1916.2	12.03	12.38	20 46.3
28	13 11 36.47	9.910	5 26 35.1	51.37	9.856 4738	1895.5	11.90	12.25	20 46.3
29	13 15 35.03	9.969	5 47 12.5	51.74	9.860 9986	1875.2	11.77	12.12	20 46.3
30	13 19 34.99	10.027	6 7 58.3	52.07	9.865 4748	1855.1	11.66	12.00	20 46.4
ec. 1	13 23 36.34	+10.085	− 6 28 51.8	−52.37	9.869 9032	+1835.3	11.53	11.87	20 46.5
2	13 27 39.07	10.143	6 49 51.9	52.63	9.874 2846	1815.8	11.42	11.75	20 46.6
3	13 31 43.18	10.200	7 10 57.9	52.86	9.878 6195	1796.7	11.31	11.64	20 46.8
4	13 35 48.66	10.257	7 32 8.8	53.04	9.882 9088	1777.8	11.19	11.52	20 47.0
5	13 39 55.52	10.315	7 53 23.7	53.19	9.887 1529	1759.0	11.09	11.41	20 47.2
6	13 44 3.76	+10.372	− 8 14 41.7	−53.30	9.891 3522	+1740.4	10.98	11.30	20 47.4
7	13 48 13.37	10.429	8 36 2.0	53.38	9.895 5072	1722.1	10.87	11.19	20 47.6
8	13 52 24.36	10.487	8 57 23.6	53.41	9.899 6186	1704.0	10.78	11.09	20 47.9
9	13 56 36.74	10.544	9 18 45.6	53.41	9.903 6866	1686.0	10.67	10.98	20 48.2
10	14 0 50.49	10.602	9 40 7.2	53.38	9.907 7115	1668.1	10.57	10.88	20 48.5
11	14 5 5.62	+10.659	−10 1 27.3	−53.30	9.911 6937	+1650.4	10.47	10.78	20 48.8
12	14 9 22.14	10.717	10 22 45.1	53.18	9.915 6335	1632.8	10.39	10.69	20 49.1
13	14 13 40.04	10.774	10 43 59.6	53.03	9.919 5314	1615.5	10.29	10.59	20 49.5
14	14 17 59.31	10.832	11 5 10.0	52.83	9.923 3878	1598.2	10.20	10.50	20 49.9
15	14 22 19.96	10.889	11 26 15.2	52.60	9.927 2031	1581.2	10.11	10.41	20 50.3
16	14 26 41.98	+10.946	−11 47 14.4	−52.33	9.930 9777	+1564.4	10.03	10.32	20 50.8
17	14 31 5.37	11.003	12 8 6.6	52.02	9.934 7123	1547.8	9.94	10.23	20 51.3
18	14 35 30.13	11.060	12 28 51.0	51.67	9.938 4072	1531.4	9.85	10.14	20 51.8
19	14 39 56.25	11.117	12 49 26.6	51.29	9.942 0631	1515.2	9.77	10.06	20 52.3
20	14 44 23.75	11.174	13 9 52.6	50.87	9.945 6805	1499.3	9.69	9.97	20 52.8
21	14 48 52.61	+11.231	−13 30 8.1	−50.41	9.949 2598	+1483.5	9.61	9.89	20 53.3
22	14 53 22.84	11.288	13 50 12.1	49.92	9.952 8017	1468.1	9.53	9.81	20 53.9
23	14 57 54.43	11.345	14 10 3.8	49.39	9.956 3066	1452.7	9.45	9.73	20 54.5
24	15 2 27.38	11.402	14 29 42.4	48.82	9.959 7750	1437.7	9.38	9.65	20 55.1
25	15 7 1.70	11.458	14 49 6.9	48.22	9.963 2077	1422.9	9.31	9.58	20 55.8
26	15 11 37.37	+11.515	−15 8 16.5	−47.58	9.966 6050	+1408.3	9.23	9.50	20 56.5
27	15 16 14.40	11.571	15 27 10.3	46.90	9.969 9677	1394.0	9.16	9.43	20 57.2
28	15 20 52.78	11.628	15 45 47.5	46.19	9.973 2962	1379.9	9.09	9.36	20 57.9
29	15 25 32.52	11.684	16 4 7.3	45.45	9.976 5912	1366.0	9.03	9.29	20 58.6
30	15 30 13.61	11.740	16 22 8.8	44.67	9.979 8531	1352.3	8.96	9.22	20 59.4
31	15 34 56.04	+11.796	−16 39 51.2	−43.86	9.983 0824	+1338.8	8.89	9.15	21 0.2
32	15 39 39.82	+11.852	−16 57 13.7	−43.01	9.986 2797	+1325.6	8.82	9.08	21 1.0

FOR GREENWICH MEAN NOON.

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ′ ″	° ′ ″	′ ″	° ′ ″	′ ″		
pr.	1	85 26 49.3	1 36 54.6	+0 59.0	+0 33 37.3	+5 40.1	9.857 2161	−587
	3	88 40 42.0	1 36 58.1	1 17.8	0 44 54.0	5 36.5	9.857 1022	552
	5	91 54 41.7	1 37 1.5	1 35.8	0 56 2.5	5 31.8	9.856 9954	516
	7	95 8 48.1	1 37 4.9	1 52.5	1 7 0.6	5 26.1	9.856 8959	479
	9	98 23 1.1	1 37 8.1	2 7.8	1 17 46.2	5 19.3	9.856 8041	439
	11	101 37 20.5	1 37 11.2	+2 21.4	+1 28 17.1	+5 11.5	9.856 7204	−398
	13	104 51 45.9	1 37 14.2	2 33.3	1 38 31.4	5 2.6	9.856 6449	356
	15	108 6 17.2	1 37 17.0	2 43.2	1 48 26.9	4 52.8	9.856 5779	313
	17	111 20 53.8	1 37 19.6	2 51.0	1 58 1.8	4 42.5	9.856 5197	269
	19	114 35 35.6	1 37 22.1	2 56.6	2 7 14.1	4 30.2	9.856 4705	223
	21	117 50 22.0	1 37 24.3	+3 0.0	+2 16 2.1	+4 17.6	9.856 4304	−178
	23	121 5 12.7	1 37 26.3	3 1.0	2 24 24.0	4 4.2	9.856 3995	131
	25	124 20 7.0	1 37 28.0	2 59.7	2 32 18.2	3 49.9	9.856 3779	84
	27	127 35 4.6	1 37 29.5	2 56.2	2 39 43.1	3 34.9	9.856 3658	− 37
	29	130 50 4.9	1 37 30.7	2 50.3	2 46 37.2	3 19.1	9.856 3631	+ 10
ay	1	134 5 7.2	1 37 31.6	+2 42.3	+2 52 59.1	+3 2.8	9.856 3699	+ 58
	3	137 20 11.0	1 37 32.2	2 32.2	2 58 47.8	2 45.8	9.856 3862	105
	5	140 35 15.7	1 37 32.4	2 20.1	3 4 1.9	2 28.2	9.856 4118	151
	7	143 50 20.4	1 37 32.3	2 6.2	3 8 40.5	2 10.3	9.856 4467	198
	9	147 5 24.7	1 37 31.9	1 50.7	3 12 42.7	1 51.8	9.856 4908	243
	11	150 20 27.8	1 37 31.1	+1 33.8	+3 16 7.6	+1 33.1	9.856 5439	+288
	13	153 35 29.0	1 37 30.0	1 15.7	3 18 54.8	1 14.0	9.856 6059	332
	15	156 50 27.5	1 37 28.5	0 56.6	3 21 3.6	0 54.8	9.856 6765	374
	17	160 5 22.8	1 37 26.7	0 36.8	3 22 33.7	0 35.3	9.856 7556	416
	19	163 20 14.0	1 37 24.5	+0 16.5	3 23 24.8	+0 15.8	9.856 8428	456
	21	166 35 0.6	1 37 22.0	−0 4.0	+3 23 36.8	−0 3.8	9.856 9378	+495
	23	169 49 41.8	1 37 19.1	0 24.4	3 23 9.7	0 23.3	9.857 0405	532
	25	173 4 16.9	1 37 16.0	0 44.5	3 22 3.7	0 42.7	9.857 1503	567
	27	176 18 45.4	1 37 12.5	1 4.0	3 20 19.0	1 2.0	9.857 2670	600
	29	179 33 6.6	1 37 8.7	1 22.7	3 17 56.0	1 21.0	9.857 3901	631
	31	182 47 20.0	1 37 4.7	−1 40.3	+3 14 55.2	−1 39.7	9.857 5193	+661
une	2	186 1 25.1	1 37 0.4	1 56.6	3 11 17.4	1 58.1	9.857 6542	688
	4	189 15 21.3	1 36 55.8	2 11.5	3 7 3.2	2 16.0	9.857 7943	713
	6	192 29 8.1	1 36 51.0	2 24.6	3 2 13.6	2 33.5	9.857 9391	735
	8	195 42 45.3	1 36 46.1	2 35.9	2 56 49.6	2 50.4	9.858 0882	755
	10	198 56 12.4	1 36 41.0	−2 45.3	+2 50 52.3	−3 6.8	9.858 2411	+773
	12	202 9 29.2	1 36 35.7	2 52.5	2 44 22.9	3 22.5	9.858 3974	789
	14	205 22 35.3	1 36 30.4	2 57.6	2 37 22.6	3 37.6	9.858 5564	801
	16	208 35 30.7	1 36 25.0	3 0.4	2 29 53.0	3 51.9	9.858 7178	812
	18	211 48 15.2	1 36 19.5	3 1.0	2 21 55.5	4 5.5	9.858 8810	820
	20	215 0 48.7	1 36 14.0	−2 59.2	+2 13 31.6	−4 18.2	9.859 0455	+825
	22	218 13 11.2	1 36 8.5	2 55.3	2 4 43.1	4 30.2	9.859 2108	827
	24	221 25 22.7	1 36 3.0	2 49.1	1 55 31.5	4 41.2	9.859 3763	827
	26	224 37 23.3	1 35 57.6	2 40.9	1 45 58.8	4 51.4	9.859 5415	825
	28	227 49 13.1	1 35 52.3	2 30.6	1 36 6.7	5 0.6	9.859 7060	820
	30	231 0 52.4	1 35 47.1	−2 18.5	+1 25 57.2	−5 8.8	9.859 8692	+812
uly	2	234 12 21.4	1 35 42.0	−2 4.7	+1 15 32.1	−5 16.1	9.860 0306	[illegible]

FOR GREENWICH MEAN NOON.

FOR GREENWICH MEAN NOON.

Date.	Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
	° ′ ″	° ′ ″	′ ″	° ′ ″	′ ″		
2	20 7 27.1	1 35 44.6	−2 48.2	−2 48 32.3	+3 10.9	9.860 3497	−771
4	23 18 59.3	1 35 47.6	2 54.6	2 41 54.9	3 26.4	9.860 1939	786
6	26 30 37.7	1 35 50.8	2 58.8	2 34 47.2	3 41.3	9.860 0353	799
8	29 42 22.4	1 35 53.9	3 0.8	2 27 10.3	3 55.5	9.859 8745	809
10	32 54 13.3	1 35 57.1	3 0.6	2 19 5.6	4 9.0	9.859 7119	817
12	36 6 10.7	1 36 0.3	−2 58.1	−2 10 34.6	+4 21.9	9.859 5480	−822
14	39 18 14.5	1 36 3.6	2 53.4	2 1 38.7	4 33.9	9.859 3833	824
16	42 30 25.0	1 36 6.9	2 46.6	1 52 19.7	4 45.0	9.859 2184	824
18	45 42 42.1	1 36 10.2	2 37.6	1 42 39.1	4 55.4	9.859 0537	822
20	48 55 5.9	1 36 13.6	2 26.7	1 32 38.9	5 4.7	9.858 8898	817
22	52 7 36.7	1 36 17.1	−2 13.9	−1 22 20.8	+5 13.2	9.858 7272	−809
24	55 20 14.3	1 36 20.5	1 59.4	1 11 46.8	5 20.7	9.858 5663	799
26	58 32 58.9	1 36 24.1	1 43.4	1 0 58.7	5 27.2	9.858 4077	786
28	61 45 50.6	1 36 27.6	1 26.1	0 49 58.7	5 32.6	9.858 2520	771
30	64 58 49.4	1 36 31.2	1 7.7	0 38 48.8	5 37.1	9.858 0995	753
r. 1	68 11 55.4	1 36 34.8	−0 48.5	−0 27 31.0	+5 40.5	9.857 9506	−733
3	71 25 8.6	1 36 38.4	0 28.6	0 16 7.6	5 42.8	9.857 8064	711
5	74 38 29.1	1 36 42.1	−0 8.3	−0 4 40.7	5 44.0	9.857 6667	686
7	77 51 56.8	1 36 45.6	+0 12.1	+0 6 47.6	5 44.1	9.857 5322	659
9	81 5 31.6	1 36 49.2	0 32.3	0 18 14.9	5 43.1	9.857 4033	630
11	84 19 13.6	1 36 52.8	+0 52.1	+0 29 39.2	+5 41.0	9.857 2805	−599
13	87 33 2.7	1 36 56.3	1 11.3	0 40 58.2	5 37.8	9.857 1640	566
15	90 46 58.8	1 36 59.8	1 29.6	0 52 9.8	5 33.6	9.857 0544	530
17	94 1 1.7	1 37 3.1	1 46.8	1 3 11.7	5 28.2	9.856 9520	494
19	97 15 11.2	1 37 6.4	2 2.6	1 14 1.8	5 21.8	9.856 8571	455
21	100 29 27.2	1 37 9.5	+2 16.8	+1 24 38.1	+5 14.3	9.856 7701	−415
23	103 43 49.3	1 37 12.6	2 29.3	1 34 58.3	5 5.8	9.856 6911	374
25	106 58 17.5	1 37 15.5	2 39.9	1 45 0.6	4 56.2	9.856 6205	332
27	110 12 51.2	1 37 18.2	2 48.5	1 54 42.9	4 45.8	9.856 5585	288
29	113 27 30.2	1 37 20.8	2 54.9	2 4 3.3	4 34.4	9.856 5054	243
:. 1	116 42 14.1	1 37 23.1	+2 59.1	+2 12 59.9	+4 22.1	9.856 4612	−198
3	119 57 2.3	1 37 25.2	3 0.9	2 21 31.2	4 9.0	9.856 4262	152
5	123 11 54.6	1 37 27.0	3 0.5	2 29 35.2	3 55.0	9.856 4004	106
7	126 26 50.3	1 37 28.6	2 57.7	2 37 10.5	3 40.2	9.856 3840	59
9	129 41 48.9	1 37 29.9	2 52.6	2 44 15.5	3 24.8	9.856 3769	− 12
11	132 56 49.8	1 37 31.0	+2 45.3	+2 50 48.9	+3 8.6	9.856 3793	+ 36
13	136 11 52.5	1 37 31.7	2 35.9	2 56 49.3	2 51.8	9.856 3911	82
15	139 26 56.3	1 37 32.1	2 24.5	3 2 15.6	2 34.5	9.856 4122	129
17	142 42 0.6	1 37 32.2	2 11.3	3 7 6.8	2 16.6	9.856 4427	176
19	145 57 4.7	1 37 31.9	1 56.3	3 11 21.8	1 58.4	9.856 4824	221
21	149 12 7.8	1 37 31.2	+1 39.9	+3 15 0.0	+1 39.7	9.856 5311	+266
23	152 27 9.4	1 37 30.3	1 22.2	3 18 0.5	1 20.7	9.856 5887	310
25	155 42 8.7	1 37 29.0	1 3.4	3 20 22.8	1 1.5	9.856 6550	353
27	158 57 5.1	1 37 27.3	0 43.8	3 22 6.5	0 42.1	9.856 7298	395
29	162 11 57.7	1 37 25.2	0 23.7	3 23 11.3	0 22.6	9.856 8129	435
31	165 26 45.9	1 37 22.9	+0 3.2	+3 23 37.0	+0 3.1	9.856 9039	+474
33	168 41 29.1	1 37 20.2	−0 17.2	+3 23 23.6	−0 16.4	9.857 0026	+512

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FOR GREENWICH MEAN NOON.

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		° ′ ″	′ ″	″	° ′ ″	″		
Jan.	1	330 1 58.6	38 4.9	−20.3	−1 48 56.0	+14.2	0.140 4578	− 318
	3	331 18 9.0	38 5.5	22.5	1 48 26.0	15.8	0.140 4032	228
	5	332 34 20.4	38 5.8	24.7	1 47 52.8	17.4	0.140 3667	137
	7	333 50 32.2	38 6.0	26.8	1 47 16.5	19.0	0.140 3484	− 46
	9	335 6 44.2	38 6.0	28.8	1 46 36.9	20.6	0.140 3483	+ 45
	11	336 22 55.9	38 5.7	−30.8	−1 45 54.3	+22.1	0.140 3664	+ 136
	13	337 39 7.0	38 5.3	32.7	1 45 8.5	23.7	0.140 4027	227
	15	338 55 17.0	38 4.7	34.5	1 44 19.7	25.2	0.140 4571	317
	17	340 11 25.7	38 3.9	36.3	1 43 27.8	26.7	0.140 5296	408
	19	341 27 32.6	38 2.9	38.1	1 42 32.8	28.3	0.140 6202	498
	21	342 43 37.3	38 1.8	−39.7	−1 41 34.8	+29.7	0.140 7288	+ 588
	23	343 59 39.5	38 0.4	41.3	1 40 34.0	31.2	0.140 8553	677
	25	345 15 38.8	37 58.8	42.7	1 39 30.2	32.6	0.140 9996	766
	27	346 31 34.7	37 57.1	44.1	1 38 23.6	34.0	0.141 1617	855
	29	347 47 27.0	37 55.2	45.5	1 37 14.1	35.4	0.141 3414	942
	31	349 3 15.2	37 53.1	−46.7	−1 36 1.9	+36.8	0.141 5386	+1029
Feb.	2	350 18 59.1	37 50.8	47.8	1 34 46.9	38.2	0.141 7531	1116
	4	351 34 38.1	37 48.3	48.8	1 33 29.2	39.5	0.141 9848	1201
	6	352 50 12.1	37 45.6	49.8	1 32 9.0	40.8	0.142 2336	1286
	8	354 5 40.5	37 42.8	50.6	1 30 46.1	42.1	0.142 4993	1370
	10	355 21 3.2	37 39.9	−51.4	−1 29 20.7	+43.3	0.142 7817	+1453
	12	356 36 19.8	37 36.7	52.0	1 27 52.9	44.5	0.143 0806	1535
	14	357 51 29.8	37 33.3	52.6	1 26 22.7	45.7	0.143 3958	1617
	16	359 6 33.0	37 29.8	53.0	1 24 50.1	46.9	0.143 7272	1697
	18	0 21 29.1	37 26.2	53.4	1 23 15.3	48.0	0.144 0744	1775
	20	1 36 17.8	37 22.4	−53.6	−1 21 38.3	+49.1	0.144 4373	+1853
	22	2 50 58.7	37 18.5	53.7	1 19 59.1	50.1	0.144 8155	1929
	24	4 5 31.6	37 14.3	53.8	1 18 17.8	51.2	0.145 2090	2005
	26	5 19 56.0	37 10.1	53.7	1 16 34.5	52.2	0.145 6174	2079
	28	6 34 11.9	37 5.7	53.6	1 14 49.2	53.1	0.146 0404	2151
Mar.	2	7 48 18.8	37 1.2	−53.3	−1 13 2.1	+54.0	0.146 4778	+2223
	4	9 2 16.6	36 56.5	52.9	1 11 13.2	54.9	0.146 9294	2293
	6	10 16 4.8	36 51.7	52.5	1 9 22.5	55.8	0.147 3947	2361
	8	11 29 43.4	36 46.8	51.9	1 7 30.2	56.6	0.147 8736	2428
	10	12 43 12.0	36 41.8	51.3	1 5 36.2	57.4	0.148 3658	2493
	12	13 56 30.4	36 36.6	−50.5	−1 3 40.8	+58.1	0.148 8708	+2557
	14	15 9 38.3	36 31.3	49.7	1 1 43.9	58.8	0.149 3886	2620
	16	16 22 35.6	36 25.9	48.8	0 59 45.6	59.5	0.149 9186	2681
	18	17 35 22.0	36 20.4	47.8	0 57 45.9	60.2	0.150 4607	2740
	20	18 47 57.3	36 14.9	46.7	0 55 45.0	60.7	0.151 0144	2797
	22	20 0 21.4	36 9.2	−45.5	−0 53 43.0	+61.3	0.151 5795	+2853
	24	21 12 33.9	36 3.4	44.3	0 51 39.8	61.9	0.152 1556	2908
	26	22 24 34.8	35 57.5	43.0	0 49 35.6	62.4	0.152 7425	2961
	28	23 36 23.8	35 51.5	41.6	0 47 30.4	62.8	0.153 3397	3011
	30	24 48 0.8	35 45.5	40.1	0 45 24.4	63.2	0.153 9469	3061
Apr.	1	25 59 25.7	35 39.4	−38.6	−0 43 17.5	+63.6	0.154 5639	+3109
	3	27 10 38.3	35 33.2	−37.0	−0 41 9.9	+64.0	0.155 1902	+3155

FOR GREENWICH MEAN NOON.

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		° ′ ″	′ ″	″	° ′ ″	″		
r.	1	25 59 25.7	35 39.4	−38.6	−0 43 17.5	+63.6	0.154 5639	+3109
	3	27 10 38.3	35 33.2	37.0	0 41 9.9	64.0	0.155 1902	3155
	5	28 21 38.4	35 26.9	35.4	0 39 1.7	64.3	0.155 8256	3199
	7	29 32 25.9	35 20.6	33.7	0 36 52.8	64.6	0.156 4696	3241
	9	30 43 0.7	35 14.2	32.0	0 34 43.3	64.9	0.157 1220	3282
	11	31 53 22.6	35 7.7	−30.2	−0 32 33.4	+65.1	0.157 7824	+3322
	13	33 3 31.6	35 1.3	28.3	0 30 23.0	65.3	0.158 4505	3359
	15	34 13 27.6	34 54.7	26.4	0 28 12.3	65.4	0.159 1259	3395
	17	35 23 10.4	34 48.1	24.5	0 26 1.3	65.6	0.159 8083	3429
	19	36 32 39.9	34 41.5	22.6	0 23 50.0	65.7	0.160 4974	3461
	21	37 41 56.2	34 34.8	−20.6	−0 21 38.6	+65.7	0.161 1927	+3492
	23	38 50 59.1	34 28.1	18.6	0 19 27.1	65.8	0.161 8940	3521
	25	39 59 48.6	34 21.4	16.5	0 17 15.6	65.8	0.162 6010	3548
	27	41 8 24.6	34 14.6	14.5	0 15 4.0	65.8	0.163 3132	3574
	29	42 16 47.0	34 7.8	12.4	0 12 52.6	65.7	0.164 0304	3598
y	1	43 24 55.8	34 1.0	−10.3	−0 10 41.3	+65.6	0.164 7522	+3620
	3	44 32 51.0	33 54.2	8.2	0 8 30.2	65.5	0.165 4784	3641
	5	45 40 32.6	33 47.4	6.1	0 6 19.2	65.4	0.166 2086	3660
	7	46 48 0.4	33 40.5	4.0	0 4 8.6	65.2	0.166 9424	3678
	9	47 55 14.6	33 33.7	− 1.9	−0 1 58.4	65.0	0.167 6796	3694
	11	49 2 15.1	33 26.8	+ 0.2	+0 0 11.5	+64.8	0.168 4198	+3708
	13	50 9 1.9	33 20.0	2.3	0 2 20.9	64.6	0.169 1627	3721
	15	51 15 35.0	33 13.1	4.4	0 4 29.8	64.3	0.169 9080	3732
	17	52 21 54.4	33 6.3	6.4	0 6 38.2	64.1	0.170 6554	3742
	19	53 28 0.1	32 59.5	8.5	0 8 46.0	63.8	0.171 4047	3750
	21	54 33 52.2	32 52.6	+10.5	+0 10 53.2	+63.4	0.172 1554	+3757
	23	55 39 30.6	32 45.8	12.5	0 12 59.6	63.1	0.172 9074	3763
	25	56 44 55.4	32 39.0	14.5	0 15 5.4	62.7	0.173 6603	3766
	27	57 50 6.7	32 32.2	16.4	0 17 10.4	62.3	0.174 4138	3769
	29	58 55 4.4	32 25.5	18.4	0 19 14.6	61.9	0.175 1677	3770
	31	59 59 48.7	32 18.8	+20.3	+0 21 17.9	+61.4	0.175 9217	+3770
ne	2	61 4 19.5	32 12.0	22.2	0 23 20.4	61.0	0.176 6755	3768
	4	62 8 36.9	32 5.4	23.9	0 25 22.0	60.6	0.177 4288	3765
	6	63 12 41.0	31 58.7	25.7	0 27 22.6	60.1	0.178 1813	3760
	8	64 16 31.9	31 52.1	27.4	0 29 22.2	59.6	0.178 9329	3755
	10	65 20 9.6	31 45.5	+29.1	+0 31 20.8	+59.1	0.179 6832	+3748
	12	66 23 34.1	31 39.0	30.8	0 33 18.4	58.5	0.180 4321	3740
	14	67 26 45.7	31 32.5	32.4	0 35 14.9	57.9	0.181 1792	3731
	16	68 29 44.3	31 26.1	33.9	0 37 10.2	57.4	0.181 9243	3720
	18	69 32 30.0	31 19.6	35.4	0 39 4.5	56.9	0.182 6672	3708
	20	70 35 2.9	31 13.3	+36.9	+0 40 57.6	+56.2	0.183 4076	+3695
	22	71 37 23.1	31 6.9	38.3	0 42 49.4	55.6	0.184 1453	3681
	24	72 39 30.7	31 0.7	39.6	0 44 40.1	55.0	0.184 8801	3666
	26	73 41 25.8	30 54.5	40.9	0 46 29.4	54.4	0.185 6118	3650
	28	74 43 8.5	30 48.3	42.1	0 48 17.6	53.8	0.186 3402	3633
	30	75 44 38.9	30 42.1	+43.3	+0 50 4.4	+53.1	0.187 0649	+3615
ly	2	76 45 57.0	30 36.0	+44.4	+0 51 50.0	+52.5	0.187 7860	+3595

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		° ′ ″	′ ″	″	° ′ ″	″		
July	2	76 45 57.0	30 36.0	+44.4	+0 51 50.0	+52.5	0.187 7860	+3596
	4	77 47 3.1	30 30.0	45.5	0 53 34.2	51.7	0.188 5030	3575
	6	78 47 57.2	30 24.1	46.5	0 55 17.0	51.1	0.189 2159	3554
	8	79 48 39.4	30 18.2	47.4	0 56 58.5	50.4	0.189 9244	3531
	10	80 49 9.9	30 12.3	48.2	0 58 38.6	49.7	0.190 6283	3508
	12	81 49 28.7	30 6.5	+49.0	+1 0 17.2	+49.0	0.191 3275	+3484
	14	82 49 36.0	30 0.8	49.8	1 1 54.5	48.3	0.192 0218	3459
	16	83 49 31.8	29 55.1	50.5	1 3 30.3	47.5	0.192 7110	3433
	18	84 49 16.4	29 49.5	51.1	1 5 4.6	46.8	0.193 3949	3406
	20	85 48 49.8	29 43.9	51.6	1 6 37.6	46.1	0.194 0734	3378
	22	86 48 12.1	29 38.4	+52.1	+1 8 9.0	+45.4	0.194 7462	+3350
	24	87 47 23.6	29 33.0	52.5	1 9 38.9	44.6	0.195 4133	3321
	26	88 46 24.3	29 27.7	52.9	1 11 7.3	43.8	0.196 0745	3291
	28	89 45 14.3	29 22.4	53.2	1 12 34.2	43.1	0.196 7296	3260
	30	90 43 53.8	29 17.2	53.4	1 13 59.6	42.3	0.197 3785	3229
Aug.	1	91 42 23.0	29 12.0	+53.6	+1 15 23.4	+41.5	0.198 0211	+3197
	3	92 40 41.9	29 6.9	53.7	1 16 45.6	40.8	0.198 6571	3163
	5	93 38 50.7	29 1.9	53.8	1 18 6.4	40.0	0.199 2864	3130
	7	94 36 49.5	28 56.9	53.8	1 19 25.5	39.2	0.199 9090	3096
	9	95 34 38.5	28 52.1	53.7	1 20 43.1	38.4	0.200 5247	3061
	11	96 32 17.8	28 47.2	+53.6	+1 21 59.1	+37.6	0.201 1333	+3025
	13	97 29 47.5	28 42.5	53.4	1 23 13.5	36.8	0.201 7347	2989
	15	98 27 7.8	28 37.8	53.1	1 24 26.3	36.0	0.202 3289	2952
	17	99 24 18.8	28 33.2	52.8	1 25 37.5	35.2	0.202 9156	2915
	19	100 21 20.7	28 28.7	52.5	1 26 47.2	34.4	0.203 4948	2877
	21	101 18 13.6	28 24.2	+52.0	+1 27 55.2	+33.6	0.204 0664	+2839
	23	102 14 57.6	28 19.8	51.5	1 29 1.5	32.7	0.204 6303	2800
	25	103 11 32.9	28 15.5	51.0	1 30 6.2	32.0	0.205 1863	2760
	27	104 7 59.7	28 11.3	50.4	1 31 9.4	31.2	0.205 7343	2720
	29	105 4 18.1	28 7.1	49.8	1 32 10.8	30.4	0.206 2744	2680
	31	106 0 28.2	28 3.0	+49.1	+1 33 10.7	+29.6	0.206 8062	+2639
Sept.	2	106 56 30.1	27 59.0	48.3	1 34 9.0	28.7	0.207 3298	2597
	4	107 52 24.1	27 55.0	47.5	1 35 5.6	27.9	0.207 8451	2556
	6	108 48 10.2	27 51.1	46.7	1 36 0.6	27.1	0.208 3520	2513
	8	109 43 48.7	27 47.3	45.8	1 36 54.0	26.3	0.208 8503	2470
	10	110 39 19.6	27 43.6	+44.9	+1 37 45.7	+25.5	0.209 3400	+2427
	12	111 34 43.1	27 39.9	43.9	1 38 35.8	24.6	0.209 8212	2384
	14	112 29 59.4	27 36.4	42.9	1 39 24.2	23.8	0.210 2935	2340
	16	113 25 8.6	27 32.9	41.8	1 40 11.0	23.0	0.210 7571	2296
	18	114 20 10.9	27 29.4	40.7	1 40 56.2	22.1	0.211 2117	2251
	20	115 15 6.4	27 26.1	+39.6	+1 41 39.6	+21.3	0.211 6574	+2206
	22	116 9 55.2	27 22.8	38.4	1 42 21.5	20.5	0.212 0941	2161
	24	117 4 37.6	27 19.6	37.2	1 43 1.8	19.7	0.212 5217	2115
	26	117 59 13.6	27 16.4	35.9	1 43 40.3	18.9	0.212 9401	2069
	28	118 53 43.4	27 13.4	34.6	1 44 17.3	18.1	0.213 3492	2023
	30	119 48 7.1	27 10.4	+33.3	+1 44 52.6	+17.2	0.213 7491	+1976
Oct.	2	120 42 24.9	27 7.5	+32.0	+1 45 26.2	+16.4	0.214 1396	+1929

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Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ′ ″	′ ″	″	° ′ ″	″		
t.	2	120 42 24.9	27 7.5	+32.0	+1 45 26.2	+16.4	0.214 1396	+1929
	4	121 36 37.0	27 4.6	30.6	1 45 58.3	15.6	0.214 5208	1882
	6	122 30 43.5	27 1.9	29.2	1 46 28.7	14.8	0.214 8924	1834
	8	123 24 44.5	26 59.2	27.7	1 46 57.5	14.0	0.215 2546	1787
	10	124 18 40.2	26 56.6	26.3	1 47 24.6	13.1	0.215 6072	1739
	12	125 12 30.8	26 54.0	+24.8	+1 47 50.1	+12.4	0.215 9502	+1691
	14	126 6 16.4	26 51.6	23.3	1 48 14.1	11.6	0.216 2836	1643
	16	126 59 57.2	26 49.2	21.8	1 48 36.4	10.7	0.216 6072	1594
	18	127 53 33.2	26 46.9	20.2	1 48 57.0	9.9	0.216 9211	1545
	20	128 47 4.7	26 44.6	18.7	1 49 16.1	9.1	0.217 2252	1496
	22	129 40 31.8	26 42.5	+17.1	+1 49 33.5	+ 8.3	0.217 5196	+1447
	24	130 33 54.6	26 40.4	15.5	1 49 49.4	7.5	0.217 8040	1397
	26	131 27 13.3	26 38.3	13.9	1 50 3.6	6.7	0.218 0785	1348
	28	132 20 28.0	26 36.4	12.3	1 50 16.2	5.9	0.218 3431	1298
	30	133 13 39.0	26 34.6	10.7	1 50 27.2	5.1	0.218 5978	1248
v.	1	134 6 46.3	26 32.8	+ 9.0	+1 50 36.6	+ 4.3	0.218 8424	+1198
	3	134 59 50.1	26 31.0	7.4	1 50 44.5	3.6	0.219 0771	1148
	5	135 52 50.5	26 29.4	5.7	1 50 50.8	2.8	0.219 3017	1098
	7	136 45 47.7	26 27.8	4.1	1 50 55.5	1.9	0.219 5162	1047
	9	137 38 41.9	26 26.4	2.4	1 50 58.6	1.1	0.219 7206	996
	11	138 31 33.2	26 24.9	+ 0.8	+1 51 0.1	+ 0.4	0.219 9148	+ 946
	13	139 24 21.7	26 23.6	− 0.9	1 51 0.1	− 0.4	0.220 0989	895
	15	140 17 7.6	26 22.3	2.5	1 50 58.4	1.2	0.220 2728	844
	17	141 9 51.0	26 21.1	4.2	1 50 55.3	2.0	0.220 4365	793
	19	142 2 32.1	26 20.0	5.8	1 50 50.5	2.8	0.220 5900	742
	21	142 55 11.0	26 19.0	− 7.4	+1 50 44.2	− 3.6	0.220 7332	+ 690
	23	143 47 48.0	26 18.0	9.1	1 50 36.3	4.3	0.220 8662	639
	25	144 40 23.0	26 17.1	10.7	1 50 26.9	5.1	0.220 9889	588
	27	145 32 56.4	26 16.3	12.3	1 50 16.0	5.9	0.221 1013	537
	29	146 25 28.1	26 15.5	13.9	1 50 3.5	6.6	0.221 2035	485
c.	1	147 17 58.4	26 14.8	−15.5	+1 49 49.6	− 7.4	0.221 2952	+ 433
	3	148 10 27.5	26 14.2	17.0	1 49 34.0	8.2	0.221 3767	382
	5	149 2 55.4	26 13.7	18.6	1 49 17.0	8.9	0.221 4479	330
	7	149 55 22.4	26 13.3	20.1	1 48 58.4	9.7	0.221 5087	278
	9	150 47 48.5	26 12.9	21.6	1 48 38.2	10.4	0.221 5591	226
	11	151 40 14.0	26 12.6	−23.1	+1 48 16.7	−11.1	0.221 5992	+ 175
	13	152 32 38.9	26 12.4	24.6	1 47 53.6	12.0	0.221 6290	123
	15	153 25 3.5	26 12.2	26.0	1 47 28.9	12.7	0.221 6484	71
	17	154 17 27.8	26 12.1	27.5	1 47 2.8	13.4	0.221 6574	+ 19
	19	155 9 52.0	26 12.1	28.9	1 46 35.2	14.2	0.221 6560	− 33
	21	156 2 16.3	26 12.2	−30.2	+1 46 6.1	−14.9	0.221 6442	− 85
	23	156 54 40.8	26 12.3	31.6	1 45 35.5	15.6	0.221 6221	136
	25	157 47 5.7	26 12.6	32.9	1 45 3.5	16.4	0.221 5897	188
	27	158 39 31.1	26 12.9	34.2	1 44 30.0	17.1	0.221 5468	240
	29	159 31 57.2	26 13.2	35.4	1 43 55.0	17.9	0.221 4936	292
	31	160 24 24.1	26 13.7	−36.6	+1 43 18.5	−18.6	0.221 4300	− 344
	33	161 16 51.9	26 14.2	−37.8	+1 42 40.6	−19.3	0.221 3561	− 395

MEAN TIME.

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Polar Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
	h m s	s	° ′ ″	″			″	″	h m
b. 16	6 26 33.94	−0.506	+23 26 18.6	+0.60	0.654 5467	+504.4	20.85	1.95	8 43.4
17	6 26 22.20	0.472	23 26 32.6	0.57	0.655 7643	510.2	20.79	1.94	8 39.2
18	6 26 11.30	0.437	23 26 45.9	0.54	0.656 9956	515.8	20.73	1.94	8 35.1
19	6 26 1.24	0.401	23 26 58.7	0.52	0.658 2400	521.2	20.67	1.93	8 31.0
20	6 25 52.04	0.366	23 27 10.8	0.49	0.659 4970	526.3	20.61	1.93	8 26.9
21	6 25 43.68	−0.330	+23 27 22.3	+0.47	0.660 7661	+531.2	20.55	1.92	8 22.9
22	6 25 36.18	0.295	23 27 33.3	0.44	0.662 0467	535.9	20.49	1.92	8 18.9
23	6 25 29.54	0.259	23 27 43.6	0.42	0.663 3383	540.3	20.43	1.91	8 14.8
24	6 25 23.76	0.223	23 27 53.3	0.39	0.664 6402	544.6	20.37	1.90	8 10.8
25	6 25 18.84	0.187	23 28 2.4	0.37	0.665 9521	548.6	20.31	1.90	8 6.8
26	6 25 14.79	−0.151	+23 28 11.0	+0.34	0.667 2733	+552.4	20.25	1.89	8 2.8
27	6 25 11.61	0.114	23 28 18.9	0.32	0.668 6033	555.9	20.19	1.89	7 58.8
28	6 25 9.30	0.078	23 28 26.2	0.29	0.669 9414	559.2	20.12	1.88	7 54.8
ar. 1	6 25 7.86	0.042	23 28 33.0	0.27	0.671 2872	562.2	20.06	1.88	7 50.9
2	6 25 7.28	−0.006	23 28 39.2	0.25	0.672 6400	565.1	20.00	1.87	7 46.9
3	6 25 7.57	+0.030	+23 28 44.8	+0.22	0.673 9994	+567.7	19.94	1.86	7 43.0
4	6 25 8.73	0.066	23 28 49.8	0.20	0.675 3648	570.1	19.88	1.86	7 39.1
5	6 25 10.76	0.103	23 28 54.3	0.18	0.676 7357	572.2	19.81	1.85	7 35.2
6	6 25 13.65	0.138	23 28 58.2	0.15	0.678 1114	574.2	19.75	1.85	7 31.3
7	6 25 17.39	0.174	23 29 1.5	0.12	0.679 4915	575.9	19.69	1.84	7 27.5
8	6 25 22.00	+0.210	+23 29 4.2	+0.10	0.680 8754	+577.3	19.62	1.83	7 23.6
9	6 25 27.46	0.245	23 29 6.4	0.08	0.682 2626	578.6	19.56	1.83	7 19.8
10	6 25 33.76	0.280	23 29 8.0	0.05	0.683 6527	579.7	19.50	1.82	7 16.0
11	6 25 40.90	0.315	23 29 9.0	+0.03	0.685 0451	580.6	19.44	1.82	7 12.2
12	6 25 48.88	0.350	23 29 9.4	0.00	0.686 4395	581.4	19.38	1.81	7 8.4
13	6 25 57.69	+0.384	+23 29 9.2	−0.02	0.687 8355	+581.9	19.31	1.81	7 4.6
14	6 26 7.33	0.419	23 29 8.5	0.04	0.689 2325	582.3	19.25	1.80	7 0.8
15	6 26 17.78	0.452	23 29 7.2	0.07	0.690 6303	582.5	19.19	1.79	6 57.0
16	6 26 29.04	0.486	23 29 5.3	0.09	0.692 0283	582.5	19.13	1.79	6 53.3
17	6 26 41.11	0.520	23 29 2.8	0.12	0.693 4263	582.4	19.07	1.78	6 49.6
18	6 26 53.98	+0.553	+23 28 59.7	−0.14	0.694 8238	+582.2	19.00	1.78	6 45.9
19	6 27 7.65	0.586	23 28 56.0	0.17	0.696 2205	581.7	18.94	1.77	6 42.2
20	6 27 22.10	0.619	23 28 51.6	0.20	0.697 6159	581.1	18.88	1.77	6 38.5
21	6 27 37.34	0.651	23 28 46.6	0.22	0.699 0098	580.4	18.82	1.76	6 34.8
22	6 27 53.35	0.683	23 28 41.0	0.25	0.700 4018	579.6	18.76	1.75	6 31.2
23	6 28 10.13	+0.715	+23 28 34.7	−0.28	0.701 7916	+578.5	18.70	1.75	6 27.5
24	6 28 27.68	0.747	23 28 27.7	0.30	0.703 1787	577.4	18.64	1.74	6 23.9
25	6 28 45.99	0.779	23 28 20.1	0.33	0.704 5630	576.1	18.58	1.74	6 20.2
26	6 29 5.05	0.810	23 28 11.8	0.36	0.705 9440	574.7	18.52	1.73	6 16.6
27	6 29 24.86	0.841	23 28 2.7	0.39	0.707 3214	573.1	18.47	1.73	6 13.0
28	6 29 45.40	+0.871	+23 27 53.0	−0.42	0.708 6949	+571.4	18.41	1.72	6 9.4
29	6 30 6.68	0.902	23 27 42.5	0.45	0.710 0642	569.6	18.35	1.72	6 5.8
30	6 30 28.69	0.932	23 27 31.3	0.48	0.711 4288	567.6	18.29	1.71	6 2.3
31	6 30 51.41	0.962	23 27 19.3	0.52	0.712 7885	565.5	18.23	1.70	5 58.7
pr. 1	6 31 14.85	0.992	23 27 6.5	0.55	0.714 1430	563.2	18.18	1.70	5 55.2
2	6 31 39.00	+1.021	+23 26 53.0	−0.58	0.715 4919	+560.9	18.12	1.69	5 51.7
3	6 32 3.84	+1.049	+23 26 38.7	−0.61	0.716 8349	+558.3	18.07	1.69	5 48.2

MEAN TIME.

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ′ ″	″			″	″	h m
17	6 59 37.61	+1.975	+22 59 36.2	−2.64	0.767 0555	+373.8	16.09	1.50	3 22.6
18	7 0 25.19	1.989	22 58 32.2	2.69	0.767 9464	368.6	16.06	1.50	3 19.5
19	7 1 13.09	2.002	22 57 26.9	2.75	0.768 8247	363.4	16.03	1.50	3 16.4
20	7 2 1.31	2.016	22 56 20.2	2.81	0.769 6905	358.1	15.99	1.50	3 13.2
21	7 2 49.85	2.029	22 55 12.1	2.87	0.770 5437	352.8	15.96	1.49	3 10.1
22	7 3 38.70	+2.042	+22 54 2.6	−2.92	0.771 3841	+347.5	15.93	1.49	3 7.0
23	7 4 27.85	2.054	22 52 51.7	2.98	0.772 2118	342.2	15.90	1.49	3 3.9
24	7 5 17.30	2.066	22 51 39.4	3.04	0.773 0267	336.8	15.87	1.48	3 0.8
25	7 6 7.04	2.079	22 50 25.6	3.10	0.773 8286	331.4	15.84	1.48	2 57.7
26	7 6 57.07	2.090	22 49 10.5	3.16	0.774 6176	326.0	15.81	1.48	2 54.6
27	7 7 47.38	+2.102	+22 47 53.9	−3.22	0.775 3934	+320.5	15.79	1.48	2 51.5
28	7 8 37.96	2.113	22 46 35.9	3.28	0.776 1562	315.1	15.76	1.47	2 48.4
29	7 9 28.81	2.124	22 45 16.4	3.34	0.776 9057	309.5	15.73	1.47	2 45.3
30	7 10 19.91	2.134	22 43 55.5	3.40	0.777 6420	304.0	15.70	1.47	2 42.2
31	7 11 11.25	2.144	22 42 33.1	3.46	0.778 3649	298.4	15.68	1.47	2 39.1
e 1	7 12 2.84	+2.155	+22 41 9.3	−3.52	0.779 0745	+292.9	15.65	1.46	2 36.0
2	7 12 54.67	2.164	22 39 44.0	3.58	0.779 7706	287.3	15.63	1.46	2 33.0
3	7 13 46.72	2.173	22 38 17.3	3.64	0.780 4534	281.7	15.60	1.46	2 29.9
4	7 14 38.99	2.183	22 36 49.2	3.70	0.781 1226	276.0	15.58	1.46	2 26.8
5	7 15 31.48	2.191	22 35 19.6	3.76	0.781 7784	270.5	15.56	1.45	2 23.8
6	7 16 24.17	+2.200	+22 33 48.6	−3.82	0.782 4208	+264.8	15.53	1.45	2 20.7
7	7 17 17.06	2.208	22 32 16.1	3.88	0.783 0496	259.2	15.51	1.45	2 17.7
8	7 18 10.15	2.216	22 30 42.2	3.94	0.783 6649	253.6	15.49	1.45	2 14.6
9	7 19 3.43	2.224	22 29 6.8	4.00	0.784 2667	247.9	15.47	1.45	2 11.6
10	7 19 56.88	2.231	22 27 30.0	4.06	0.784 8549	242.3	15.45	1.44	2 8.5
11	7 20 50.52	+2.238	+22 25 51.8	−4.12	0.785 4296	+236.6	15.43	1.44	2 5.5
12	7 21 44.32	2.245	22 24 12.1	4.19	0.785 9908	231.0	15.41	1.44	2 2.4
13	7 22 38.29	2.252	22 22 30.9	4.25	0.786 5386	225.4	15.39	1.44	1 59.4
14	7 23 32.42	2.259	22 20 48.3	4.30	0.787 0728	219.8	15.37	1.44	1 56.4
15	7 24 26.71	2.265	22 19 4.3	4.36	0.787 5935	214.1	15.35	1.44	1 53.3
16	7 25 21.14	+2.271	+22 17 18.8	−4.43	0.788 1005	+208.4	15.33	1.43	1 50.3
17	7 26 15.72	2.277	22 15 31.8	4.49	0.788 5940	202.8	15.31	1.43	1 47.3
18	7 27 10.44	2.283	22 13 43.4	4.55	0.789 0738	197.1	15.30	1.43	1 44.3
19	7 28 5.30	2.288	22 11 53.6	4.61	0.789 5399	191.3	15.28	1.43	1 41.2
20	7 29 0.28	2.294	22 10 2.3	4.67	0.789 9923	185.7	15.26	1.43	1 38.2
21	7 29 55.40	+2.299	+22 8 9.5	−4.73	0.790 4311	+180.0	15.25	1.43	1 35.2
22	7 30 50.63	2.304	22 6 15.3	4.79	0.790 8561	174.2	15.23	1.42	1 32.2
23	7 31 45.98	2.308	22 4 19.7	4.85	0.791 2673	168.5	15.22	1.42	1 29.2
24	7 32 41.43	2.313	22 2 22.7	4.90	0.791 6647	162.7	15.21	1.42	1 26.2
25	7 33 36.99	2.317	22 0 24.3	4.96	0.792 0482	156.9	15.19	1.42	1 23.1
26	7 34 32.65	+2.321	+21 58 24.5	−5.02	0.792 4179	+151.1	15.18	1.42	1 20.1
27	7 35 28.40	2.325	21 56 23.2	5.08	0.792 7736	145.3	15.17	1.42	1 17.1
28	7 36 24.23	2.328	21 54 20.6	5.14	0.793 1153	139.4	15.16	1.42	1 14.1
29	7 37 20.14	2.331	21 52 16.6	5.20	0.793 4429	133.6	15.14	1.42	1 11.1
30	7 38 16.13	2.334	21 50 11.2	5.25	0.793 7565	127.8	15.13	1.41	1 8.1
y 1	7 39 12.18	+2.337	+21 48 4.5	−5.31	0.794 0562	+121.9	15.12	1.41	1 5.1
2	7 40 8.29	+2.339	+21 45 56.4	−5.36	0.794 3418	+116.1	15.11	1.41	1 2.3

G MEAN TIME.

MEAN TIME.

MEAN TIME.

MEAN TIME.

FOR MEAN NOON.

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ′ ″	′ ″	″	° ′ ″	″		
uly	2	115 45 26.6	4 54.05	+14.3	+0 21 51.3	+6.45	0.719 7588	+292.8
	6	116 5 2.5	4 53.90	14.6	0 22 17.1	6.44	0.719 8758	292.2
	10	116 24 37.8	4 53.74	14.8	0 22 42.8	6.42	0.719 9926	291.7
	14	116 44 12.4	4 53.59	15.1	0 23 8.5	6.40	0.720 1092	291.4
	18	117 3 46.5	4 53.44	15.4	0 23 34.0	6.39	0.720 2257	291.0
	22	117 23 19.9	4 53.26	+15.6	+0 23 59.6	+6.38	0.720 3420	+290.5
	26	117 42 52.6	4 53.11	15.8	0 24 25.0	6.36	0.720 4581	289.9
	30	118 2 24.8	4 52.96	16.1	0 24 50.5	6.35	0.720 5739	289.4
ug.	3	118 21 56.3	4 52.78	16.3	0 25 15.8	6.34	0.720 6896	289.0
	7	118 41 27.1	4 52.64	16.6	0 25 41.2	6.32	0.720 8051	288.5
	11	119 0 57.4	4 52.50	+16.8	+0 26 6.4	+6.30	0.720 9204	+287.9
	15	119 20 27.1	4 52.34	17.0	0 26 31.6	6.29	0.721 0354	287.4
	19	119 39 56.1	4 52.19	17.3	0 26 56.7	6.26	0.721 1503	286.9
	23	119 59 24.6	4 52.04	17.5	0 27 21.7	6.24	0.721 2649	286.3
	27	120 18 52.4	4 51.87	17.7	0 27 46.6	6.23	0.721 3793	285.8
	31	120 38 19.6	4 51.72	+18.0	+0 28 11.5	+6.22	0.721 4935	+285.1
ept.	4	120 57 46.2	4 51.58	18.2	0 28 36.4	6.21	0.721 6074	284.5
	8	121 17 12.2	4 51.41	18.4	0 29 1.2	6.19	0.721 7211	284.0
	12	121 36 37.5	4 51.26	18.6	0 29 25.9	6.16	0.721 8346	283.5
	16	121 56 2.3	4 51.15	18.8	0 29 50.5	6.15	0.721 9479	282.9
	20	122 15 26.5	4 50.98	+19.1	+0 30 15.1	+6.14	0.722 0609	+282.1
	24	122 34 50.1	4 50.82	19.3	0 30 39.6	6.11	0.722 1736	281.5
	28	122 54 13.1	4 50.68	19.5	0 31 4.0	6.10	0.722 2861	281.0
ct.	2	123 13 35.5	4 50.52	19.7	0 31 28.4	6.08	0.722 3984	280.4
	6	123 32 57.3	4 50.38	19.9	0 31 52.6	6.05	0.722 5104	279.6
	10	123 52 18.5	4 50.22	+20.1	+0 32 16.8	+6.05	0.722 6221	+279.0
	14	124 11 39.1	4 50.09	20.3	0 32 41.0	6.02	0.722 7336	278.4
	18	124 30 59.2	4 49.94	20.5	0 33 5.0	6.00	0.722 8448	277.8
	22	124 50 18.6	4 49.79	20.7	0 33 29.0	6.00	0.722 9558	277.0
	26	125 9 37.5	4 49.64	20.9	0 33 53.0	5.98	0.723 0664	276.2
	30	125 28 55.7	4 49.49	+21.1	+0 34 16.8	+5.95	0.723 1768	+275.6
ov.	3	125 48 13.4	4 49.35	21.3	0 34 40.6	5.94	0.723 2869	275.0
	7	126 7 30.5	4 49.20	21.4	0 35 4.3	5.90	0.723 3968	274.2
	11	126 26 47.0	4 49.06	21.6	0 35 27.8	5.88	0.723 5063	273.5
	15	126 46 3.0	4 48.93	21.8	0 35 51.3	5.87	0.723 6156	272.9
	19	127 5 18.4	4 48.78	+22.0	+0 36 14.8	+5.85	0.723 7246	+272.1
	23	127 24 33.2	4 48.62	22.1	0 36 38.1	5.83	0.723 8333	271.2
	27	127 43 47.4	4 48.47	22.3	0 37 1.4	5.81	0.723 9416	270.5
ec.	1	128 3 1.0	4 48.34	22.5	0 37 24.6	5.80	0.724 0497	269.9
	5	128 22 14.1	4 48.20	22.6	0 37 47.8	5.78	0.724 1575	269.1
	9	128 41 26.6	4 48.05	+22.8	+0 38 10.8	+5.74	0.724 2650	+268.2
	13	129 0 38.5	4 47.91	23.0	0 38 33.7	5.72	0.724 3721	267.5
	17	129 19 49.9	4 47.78	23.1	0 38 56.6	5.71	0.724 4790	266.8
	21	129 39 0.7	4 47.64	23.3	0 39 19.4	5.68	0.724 5855	265.9
	25	129 58 11.0	4 47.50	23.4	0 39 42.0	5.65	0.724 6917	265.1
	29	130 17 20.7	4 47.36	+23.6	+0 40 4.6	+5.65	0.724 7976	+264.2
	33	130 36 29.9	4 47.23	+23.7	+0 40 27.2	+5.63	0.724 9031	+263.4

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Polar Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
	h m s	s	° ′ ″	″			″	″	h m
Jan. 1	10 1 47.96	−0.379	+13 31 13.0	+2.59	0.930 0273	−260.2	9.10	1.03	15 18.8
2	10 1 38.69	0.394	13 32 16.1	2.67	0.929 4077	256.1	9.11	1.04	15 14.7
3	10 1 29.03	0.410	13 33 21.2	2.75	0.928 7980	251.9	9.13	1.04	15 10.6
4	10 1 19.00	0.426	13 34 28.1	2.83	0.928 1986	247.6	9.14	1.04	15 6.5
5	10 1 8.59	0.441	13 35 36.9	2.90	0.927 6098	243.1	9.15	1.04	15 2.4
6	10 0 57.83	−0.456	+13 36 47.5	+2.98	0.927 0317	−238.6	9.17	1.04	14 58.3
7	10 0 46.71	0.471	13 37 59.9	3.05	0.926 4648	233.9	9.18	1.04	14 54.2
8	10 0 35.23	0.485	13 39 14.0	3.12	0.925 9091	229.2	9.19	1.04	14 50.1
9	10 0 23.41	0.500	13 40 29.7	3.19	0.925 3649	224.3	9.20	1.05	14 46.0
10	10 0 11.25	0.514	13 41 47.1	3.26	0.924 8325	219.3	9.21	1.05	14 41.8
11	9 59 58.76	−0.527	+13 43 6.1	+3.33	0.924 3122	−214.2	9.22	1.05	14 37.7
12	9 59 45.95	0.541	13 44 26.7	3.39	0.923 8042	209.1	9.23	1.05	14 33.5
13	9 59 32.81	0.554	13 45 48.8	3.45	0.923 3087	203.8	9.24	1.05	14 29.4
14	9 59 19.37	0.566	13 47 12.4	3.51	0.922 8259	198.5	9.25	1.05	14 25.2
15	9 59 5.62	0.579	13 48 37.4	3.57	0.922 3559	193.1	9.26	1.05	14 21.1
16	9 58 51.57	−0.591	+13 50 3.8	+3.63	0.921 8990	−187.6	9.27	1.05	14 16.9
17	9 58 37.24	0.603	13 51 31.5	3.68	0.921 4555	182.0	9.28	1.05	14 12.7
18	9 58 22.62	0.615	13 53 0.6	3.74	0.921 0255	176.3	9.29	1.06	14 8.5
19	9 58 7.72	0.627	13 54 30.8	3.79	0.920 6092	170.6	9.30	1.06	14 4.4
20	9 57 52.55	0.638	13 56 2.3	3.84	0.920 2068	164.7	9.31	1.06	14 0.2
21	9 57 37.12	−0.648	+13 57 35.0	+3.89	0.919 8186	−158.8	9.32	1.06	13 56.0
22	9 57 21.44	0.658	13 59 8.8	3.93	0.919 4447	152.8	9.33	1.06	13 51.8
23	9 57 5.52	0.668	14 0 43.5	3.97	0.919 0854	146.7	9.33	1.06	13 47.6
24	9 56 49.37	0.678	14 2 19.3	4.01	0.918 7408	140.5	9.34	1.06	13 43.4
25	9 56 32.99	0.687	14 3 56.0	4.05	0.918 4111	134.2	9.35	1.06	13 39.2
26	9 56 16.38	−0.696	+14 5 33.6	+4.08	0.918 0965	−127.9	9.35	1.06	13 35.0
27	9 55 59.57	0.705	14 7 12.0	4.12	0.917 7972	121.5	9.36	1.06	13 30.7
28	9 55 42.56	0.713	14 8 51.3	4.15	0.917 5132	115.1	9.37	1.06	13 26.5
29	9 55 25.35	0.721	14 10 31.3	4.18	0.917 2449	108.6	9.37	1.07	13 22.3
30	9 55 7.96	0.728	14 12 12.0	4.21	0.916 9922	102.0	9.38	1.07	13 18.1
31	9 54 50.41	−0.735	+14 13 53.2	+4.23	0.916 7555	− 95.3	9.38	1.07	13 13.9
Feb. 1	9 54 32.70	0.741	14 15 35.0	4.25	0.916 5348	88.6	9.39	1.07	13 9.6
2	9 54 14.84	0.747	14 17 17.3	4.27	0.916 3303	81.8	9.39	1.07	13 5.4
3	9 53 56.84	0.753	14 19 0.0	4.29	0.916 1420	75.1	9.40	1.07	13 1.2
4	9 53 38.72	0.758	14 20 43.0	4.30	0.915 9700	68.3	9.40	1.07	12 57.0
5	9 53 20.48	−0.762	+14 22 26.3	+4.31	0.915 8143	− 61.4	9.40	1.07	12 52.7
6	9 53 2.13	0.767	14 24 9.9	4.32	0.915 6751	54.6	9.41	1.07	12 48.5
7	9 52 43.69	0.770	14 25 53.7	4.33	0.915 5523	47.7	9.41	1.07	12 44.3
8	9 52 25.17	0.773	14 27 37.5	4.33	0.915 4462	40.8	9.41	1.07	12 40.0
9	9 52 6.57	0.776	14 29 21.5	4.33	0.915 3566	33.9	9.41	1.07	12 35.8
10	9 51 47.92	−0.778	+14 31 5.4	+4.33	0.915 2837	− 26.9	9.42	1.07	12 31.5
11	9 51 29.21	0.781	14 32 49.3	4.33	0.915 2274	20.0	9.42	1.07	12 27.3
12	9 51 10.46	0.782	14 34 33.0	4.32	0.915 1877	13.1	9.42	1.07	12 23.0
13	9 50 51.68	0.783	14 36 16.6	4.31	0.915 1646	− 6.2	9.42	1.07	12 18.8
14	9 50 32.88	0.784	14 37 59.9	4.30	0.915 1581	+ 0.8	9.42	1.07	12 14.6
15	9 50 14.07	−0.784	+14 39 43.0	+4.29	0.915 1683	+ 7.7	9.42	1.07	12 10.3
16	*9 49 55.26*	*−0.784*	+14 41 25.8	+4.28	0.915 1950	+ 14.6	9.42	1.07	12 6.1

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ′ ″	″			″	″	h m
. 16	9 49 55.26	−0.784	+14 41 25.8	+4.28	0.915 1950	+ 14.6	9.42	1.07	12 6.1
17	9 49 36.46	0.783	14 43 8.2	4.26	0.915 2383	21.5	9.42	1.07	12 1.8
18	9 49 17.68	0.782	14 44 50.3	4.24	0.915 2982	28.4	9.42	1.07	11 57.6
19	9 48 58.93	0.780	14 46 31.8	4.22	0.915 3745	35.2	9.41	1.07	11 53.3
20	9 48 40.23	0.778	14 48 12.7	4.19	0.915 4674	42.2	9.41	1.07	11 49.1
21	9 48 21.58	−0.776	+14 49 53.1	+4.17	0.915 5768	+ 49.0	9.41	1.07	11 44.9
22	9 48 2.98	0.773	14 51 32.9	4.14	0.915 7026	55.8	9.41	1.07	11 40.6
23	9 47 44.46	0.770	14 53 11.9	4.11	0.915 8448	62.7	9.40	1.07	11 36.4
24	9 47 26.03	0.766	14 54 50.1	4.08	0.916 0033	69.4	9.40	1.07	11 32.1
25	9 47 7.69	0.762	14 56 27.5	4.04	0.916 1780	76.2	9.40	1.07	11 27.9
26	9 46 49.45	−0.758	+14 58 4.1	+4.01	0.916 3689	+ 82.9	9.39	1.07	11 23.7
27	9 46 31.33	0.752	14 59 39.8	3.97	0.916 5759	89.6	9.39	1.07	11 19.4
28	9 46 13.34	0.747	15 1 14.5	3.92	0.916 7989	96.2	9.38	1.07	11 15.2
r. 1	9 45 55.48	0.741	15 2 48.2	3.88	0.917 0377	102.8	9.38	1.07	11 11.0
2	9 45 37.77	0.735	15 4 20.9	3.84	0.917 2922	109.3	9.37	1.07	11 6.8
3	9 45 20.22	−0.728	+15 5 52.5	+3.79	0.917 5623	+115.8	9.37	1.06	11 2.5
4	9 45 2.84	0.720	15 7 22.8	3.74	0.917 8479	122.2	9.36	1.06	10 58.3
5	9 44 45.64	0.713	15 8 51.9	3.69	0.918 1488	128.5	9.35	1.06	10 54.1
6	9 44 28.63	0.705	15 10 19.7	3.63	0.918 4648	134.8	9.35	1.06	10 49.9
7	9 44 11.82	0.696	15 11 46.3	3.58	0.918 7957	141.0	9.34	1.06	10 45.7
8	9 43 55.21	−0.688	+15 13 11.5	+3.52	0.919 1414	+147.1	9.33	1.06	10 41.5
9	9 43 38.82	0.678	15 14 35.3	3.46	0.919 5016	153.1	9.32	1.06	10 37.3
10	9 43 22.66	0.669	15 15 57.8	3.41	0.919 8760	159.0	9.32	1.06	10 33.1
11	9 43 6.73	0.659	15 17 18.8	3.34	0.920 2646	164.8	9.31	1.06	10 28.9
12	9 42 51.04	0.649	15 18 38.3	3.28	0.920 6671	170.6	9.30	1.06	10 24.7
13	9 42 35.60	−0.638	+15 19 56.3	+3.22	0.921 0834	+176.3	9.29	1.06	10 20.5
14	9 42 20.42	0.627	15 21 12.7	3.15	0.921 5132	181.9	9.28	1.05	10 16.3
15	9 42 5.51	0.616	15 22 27.6	3.09	0.921 9563	187.3	9.27	1.05	10 12.2
16	9 41 50.87	0.604	15 23 40.8	3.02	0.922 4124	192.8	9.26	1.05	10 8.0
17	9 41 36.50	0.593	15 24 52.4	2.95	0.922 8815	198.1	9.25	1.05	10 3.8
18	9 41 22.43	−0.580	+15 26 2.3	+2.88	0.923 3632	+203.3	9.24	1.05	9 59.6
19	9 41 8.64	0.568	15 27 10.5	2.80	0.923 8574	208.5	9.23	1.05	9 55.5
20	9 40 55.16	0.555	15 28 16.9	2.73	0.924 3638	213.5	9.22	1.05	9 51.3
21	9 40 41.98	0.543	15 29 21.6	2.66	0.924 8822	218.5	9.21	1.05	9 47.2
22	9 40 29.12	0.529	15 30 24.6	2.59	0.925 4124	223.4	9.20	1.05	9 43.1
23	9 40 16.58	−0.516	+15 31 25.7	+2.51	0.925 9542	+228.1	9.19	1.04	9 38.9
24	9 40 4.37	0.502	15 32 25.0	2.43	0.926 5073	232.8	9.18	1.04	9 34.8
25	9 39 52.49	0.488	15 33 22.4	2.35	0.927 0716	237.4	9.16	1.04	9 30.6
26	9 39 40.95	0.474	15 34 17.9	2.28	0.927 6467	241.9	9.15	1.04	9 26.5
27	9 39 29.75	0.459	15 35 11.6	2.20	0.928 2325	246.3	9.14	1.04	9 22.4
28	9 39 18.91	−0.444	+15 36 3.3	+2.11	0.928 8287	+250.5	9.13	1.04	9 18.3
29	9 39 8.42	0.429	15 36 53.0	2.03	0.929 4349	254.7	9.11	1.04	9 14.2
30	9 38 58.30	0.414	15 37 40.8	1.95	0.930 0510	258.7	9.10	1.03	9 10.1
31	9 38 48.54	0.399	15 38 26.6	1.87	0.930 6767	262.6	9.09	1.03	9 6.0
r. 1	9 38 39.15	0.383	15 39 10.4	1.78	0.931 3116	266.4	9.07	1.03	9 1.9
2	9 38 30.14	−0.368	+15 39 52.1	+1.70	0.931 9555	+270.1	9.06	1.03	8 57.8
3	9 38 21.51	−0.352	+15 40 31.8	+1.61	0.932 6082	+273.7	9.05	1.03	8 53.8

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Logarithm of Distance from Earth.	Var. per Hour.	Polar Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ′ ″	″			″	″	h m
Apr.	1	9 38 39.15	−0.383	+15 39 10.4	+1.78	0.931 3116	+266.4	9.07	1.03	9 1.9
	2	9 38 30.14	0.368	15 39 52.1	1.70	0.931 9555	270.1	9.06	1.03	8 57.8
	3	9 38 21.51	0.352	15 40 31.8	1.61	0.932 6082	273.7	9.05	1.03	8 53.8
	4	9 38 13.27	0.335	15 41 9.5	1.52	0.933 2693	277.2	9.03	1.03	8 49.7
	5	9 38 5.43	0.319	15 41 45.0	1.43	0.933 9386	280.6	9.02	1.03	8 45.7
	6	9 37 57.97	−0.302	+15 42 18.5	+1.35	0.934 6159	+283.8	9.01	1.02	8 41.6
	7	9 37 50.92	0.286	15 42 50.0	1.27	0.935 3007	286.9	8.99	1.02	8 37.6
	8	9 37 44.26	0.269	15 43 19.3	1.18	0.935 9929	289.9	8.98	1.02	8 33.5
	9	9 37 38.01	0.252	15 43 46.6	1.09	0.936 6920	292.7	8.96	1.02	8 29.5
	10	9 37 32.16	0.235	15 44 11.8	1.00	0.937 3978	295.5	8.95	1.02	8 25.5
	11	9 37 26.72	−0.218	+15 44 34.8	+0.92	0.938 1101	+298.1	8.93	1.02	8 21.4
	12	9 37 21.68	0.201	15 44 55.8	0.83	0.938 8286	300.6	8.92	1.01	8 17.4
	13	9 37 17.05	0.184	15 45 14.6	0.74	0.939 5531	303.1	8.90	1.01	8 13.4
	14	9 37 12.83	0.167	15 45 31.3	0.65	0.940 2833	305.4	8.89	1.01	8 9.4
	15	9 37 9.02	0.150	15 45 45.9	0.56	0.941 0189	307.6	8.87	1.01	8 5.4
	16	9 37 5.63	−0.133	+15 45 58.4	+0.48	0.941 7598	+309.7	8.86	1.01	8 1.4
	17	9 37 2.65	0.115	15 46 8.8	0.39	0.942 5056	311.7	8.84	1.01	7 57.5
	18	9 37 0.09	0.098	15 46 17.1	0.30	0.943 2561	313.7	8.83	1.00	7 53.5
	19	9 36 57.94	0.081	15 46 23.3	0.21	0.944 0111	315.5	8.81	1.00	7 49.5
	20	9 36 56.21	0.063	15 46 27.3	0.12	0.944 7702	317.1	8.80	1.00	7 45.6
	21	9 36 54.90	−0.046	+15 46 29.3	+0.04	0.945 5332	+318.7	8.78	1.00	7 41.6
	22	9 36 54.01	0.028	15 46 29.1	−0.05	0.946 2999	320.2	8.77	1.00	7 37.7
	23	9 36 53.54	−0.011	15 46 26.8	0.14	0.947 0701	321.6	8.75	0.99	7 33.7
	24	9 36 53.50	+0.007	15 46 22.4	0.23	0.947 8435	322.9	8.74	0.99	7 29.8
	25	9 36 53.87	0.024	15 46 15.9	0.32	0.948 6199	324.1	8.72	0.99	7 25.9
	26	9 36 54.66	+0.042	+15 46 7.2	−0.41	0.949 3991	+325.2	8.70	0.99	7 21.9
	27	9 36 55.88	0.059	15 45 56.4	0.50	0.950 1808	326.2	8.69	0.99	7 18.0
	28	9 36 57.51	0.077	15 45 43.4	0.58	0.950 9648	327.1	8.67	0.99	7 14.2
	29	9 36 59.57	0.095	15 45 28.4	0.67	0.951 7506	327.8	8.66	0.98	7 10.3
	30	9 37 2.05	0.112	15 45 11.3	0.76	0.952 5382	328.5	8.64	0.98	7 6.4
May	1	9 37 4.96	+0.130	+15 44 52.1	−0.84	0.953 3272	+329.0	8.63	0.98	7 2.5
	2	9 37 8.28	0.147	15 44 30.8	0.93	0.954 1173	329.4	8.61	0.98	6 58.6
	3	9 37 12.02	0.165	15 44 7.5	1.02	0.954 9084	329.8	8.59	0.98	6 54.7
	4	9 37 16.18	0.182	15 43 42.0	1.11	0.955 7002	330.0	8.58	0.98	6 50.9
	5	9 37 20.75	0.199	15 43 14.5	1.19	0.956 4924	330.1	8.56	0.97	6 47.0
	6	9 37 25.74	+0.216	+15 42 44.9	−1.28	0.957 2848	+330.2	8.55	0.97	6 43.2
	7	9 37 31.13	0.233	15 42 13.3	1.36	0.958 0772	330.1	8.53	0.97	6 39.3
	8	9 37 36.94	0.250	15 41 39.7	1.44	0.958 8693	330.0	8.52	0.97	6 35.5
	9	9 37 43.15	0.267	15 41 4.0	1.53	0.959 6610	329.8	8.50	0.97	6 31.7
	10	9 37 49.77	0.284	15 40 26.4	1.61	0.960 4521	329.4	8.49	0.96	6 27.9
	11	9 37 56.78	+0.301	+15 39 46.8	−1.69	0.961 2422	+329.0	8.47	0.96	6 24.0
	12	9 38 4.20	0.317	15 39 5.2	1.78	0.962 0313	328.5	8.46	0.96	6 20.2
	13	9 38 12.01	0.334	15 38 21.6	1.85	0.962 8191	328.0	8.44	0.96	6 16.4
	14	9 38 20.22	0.350	15 37 36.1	1.94	0.963 6055	327.3	8.42	0.96	6 12.6
	15	9 38 28.81	0.366	15 36 48.6	2.02	0.964 3902	326.6	8.41	0.96	6 8.8
	16	9 38 37.80	+0.383	+15 35 59.2	−2.10	0.965 1731	+325.8	8.40	0.95	6 5.1
	17	*9 38 47.17*	*+0.399*	+15 35 7.9	−2.18	0.965 9541	+325.0	8.38	0.95	6 1.3

GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension. Noon.	Var. per Hour. Noon.	Apparent Declination. Noon.	Var. per Hour. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Hour. Noon.	Polar Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
		h m s	s	° ′ ″	″			″	″	h m
July	1	9 51 36.97	+0.974	+14 27 11.1	−5.15	0.996 4109	+220.7	7.81	0.89	3 17.2
	2	9 52 0.46	0.983	14 25 6.9	5.20	0.996 9365	217.3	7.80	0.89	3 13.6
	3	9 52 24.16	0.992	14 23 1.6	5.25	0.997 4539	213.9	7.79	0.89	3 10.1
	4	9 52 48.07	1.000	14 20 55.1	5.29	0.997 9630	210.4	7.78	0.88	3 6.6
	5	9 53 12.18	1.009	14 18 47.5	5.34	0.998 4637	206.9	7.77	0.88	3 3.0
	6	9 53 36.49	+1.017	+14 16 38.8	−5.39	0.998 9560	+203.4	7.76	0.88	2 59.5
	7	9 54 1.00	1.025	14 14 29.0	5.43	0.999 4398	199.8	7.76	0.88	2 56.0
	8	9 54 25.69	1.033	14 12 18.1	5.48	0.999 9150	196.2	7.75	0.88	2 52.5
	9	9 54 50.58	1.041	14 10 6.1	5.53	1.000 3816	192.6	7.74	0.88	2 48.9
	10	9 55 15.65	1.048	14 7 52.9	5.57	1.000 8396	189.0	7.73	0.88	2 45.4
	11	9 55 40.90	+1.056	+14 5 38.9	−5.61	1.001 2889	+185.4	7.72	0.88	2 41.9
	12	9 56 6.33	1.063	14 3 23.8	5.65	1.001 7294	181.7	7.72	0.88	2 38.4
	13	9 56 31.93	1.070	14 1 7.7	5.69	1.002 1611	178.0	7.71	0.88	2 34.9
	14	9 56 57.70	1.077	13 58 50.5	5.73	1.002 5840	174.3	7.70	0.88	2 31.4
	15	9 57 23.63	1.084	13 56 32.6	5.77	1.002 9979	170.6	7.69	0.87	2 27.9
	16	9 57 49.72	+1.090	+13 54 13.6	−5.81	1.003 4029	+166.9	7.69	0.87	2 24.4
	17	9 58 15.96	1.097	13 51 53.7	5.85	1.003 7989	163.1	7.68	0.87	2 20.9
	18	9 58 42.36	1.103	13 49 32.8	5.89	1.004 1858	159.3	7.67	0.87	2 17.4
	19	9 59 8.91	1.109	13 47 11.1	5.93	1.004 5636	155.5	7.67	0.87	2 13.9
	20	9 59 35.61	1.115	13 44 48.4	5.96	1.004 9322	151.7	7.66	0.87	2 10.4
	21	10 0 2.44	+1.121	+13 42 24.9	−6.00	1.005 2916	+147.8	7.65	0.87	2 6.9
	22	10 0 29.41	1.127	13 40 0.6	6.03	1.005 6416	143.9	7.65	0.87	2 3.4
	23	10 0 56.52	1.132	13 37 35.5	6.06	1.005 9822	140.0	7.64	0.87	2 0.0
	24	10 1 23.76	1.138	13 35 9.6	6.10	1.006 3134	136.0	7.64	0.87	1 56.5
	25	10 1 51.12	1.143	13 32 42.9	6.13	1.006 6350	132.0	7.63	0.87	1 53.0
	26	10 2 18.60	+1.148	+13 30 15.4	−6.16	1.006 9471	+128.0	7.62	0.87	1 49.5
	27	10 2 46.20	1.153	13 27 47.2	6.19	1.007 2495	124.0	7.62	0.87	1 46.0
	28	10 3 13.92	1.157	13 25 18.4	6.22	1.007 5422	119.9	7.61	0.87	1 42.6
	29	10 3 41.74	1.161	13 22 48.8	6.25	1.007 8252	115.9	7.61	0.86	1 39.1
	30	10 4 9.66	1.166	13 20 18.5	6.28	1.008 0985	111.9	7.60	0.86	1 35.6
	31	10 4 37.69	+1.170	+13 17 47.6	−6.30	1.008 3621	+107.8	7.60	0.86	1 32.2
Aug.	1	10 5 5.81	1.174	13 15 16.2	6.32	1.008 6158	103.7	7.60	0.86	1 28.7
	2	10 5 34.02	1.177	13 12 44.1	6.35	1.008 8598	99.6	7.59	0.86	1 25.2
	3	10 6 2.31	1.180	13 10 11.4	6.38	1.009 0939	95.5	7.59	0.86	1 21.8
	4	10 6 30.68	1.184	13 7 38.1	6.40	1.009 3181	91.4	7.58	0.86	1 18.3
	5	10 6 59.13	+1.187	+13 5 4.3	−6.42	1.009 5324	+ 87.2	7.58	0.86	1 14.9
	6	10 7 27.66	1.190	13 2 30.0	6.44	1.009 7368	83.1	7.58	0.86	1 11.4
	7	10 7 56.26	1.193	12 59 55.3	6.46	1.009 9313	79.0	7.57	0.86	1 7.9
	8	10 8 24.93	1.196	12 57 20.1	6.48	1.010 1158	74.8	7.57	0.86	1 4.5
	9	10 8 53.65	1.198	12 54 44.4	6.50	1.010 2903	70.6	7.57	0.86	1 1.0
	10	10 9 22.44	+1.200	+12 52 8.3	−6.51	1.010 4548	+ 66.5	7.56	0.86	0 57.6
	11	10 9 51.27	1.202	12 49 31.8	6.53	1.010 6093	62.3	7.56	0.86	0 54.1
	12	10 10 20.16	1.205	12 46 54.9	6.55	1.010 7538	58.1	7.56	0.86	0 50.7
	13	10 10 49.09	1.207	12 44 17.6	6.56	1.010 8884	54.0	7.55	0.86	0 47.2
	14	10 11 18.07	1.208	12 41 40.0	6.57	1.011 0129	49.8	7.55	0.86	0 43.8
	15	10 11 47.08	+1.210	+12 39 2.1	−6.59	1.011 1274	+ 45.6	7.55	0.86	0 40.3
	16	*10 12 16.13*	*+1.211*	*+12 36 23.8*	−6.60	1.011 2318	+ 41.4	7.55	0.86	0 36.9

GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

GREENWICH MEAN TIME.

FOR MEAN NOON.

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension.	Var. per Day.	Apparent Declination.	Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
		Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
		h m s	s	° ′ ″	″			″	″	h m
an.	1	21 50 51.37	+10.337	−13 48 19.5	+55.27	1.315 9455	+2588.5	1.62	0.43	3 10.0
	5	21 51 33.72	10.828	13 44 33.2	57.84	1.316 9444	2404.8	1.62	0.42	2 55.0
	9	21 52 17.93	11.272	13 40 37.1	60.19	1.317 8681	2212.1	1.61	0.42	2 40.0
	13	21 53 3.84	11.674	13 36 32.0	62.32	1.318 7131	2012.0	1.61	0.42	2 25.0
	17	21 53 51.27	12.036	13 32 18.8	64.26	1.319 4769	1805.9	1.61	0.42	2 10.1
	21	21 54 40.07	+12.355	−13 27 58.2	+66.00	1.320 1570	+1593.4	1.60	0.42	1 55.2
	25	21 55 30.06	12.634	13 23 31.1	67.51	1.320 7508	1374.8	1.60	0.42	1 40.3
	29	21 56 21.09	12.872	13 18 58.4	68.80	1.321 2561	1150.9	1.60	0.42	1 25.4
'eb.	2	21 57 12.97	13.058	13 14 21.0	69.85	1.321 6709	922.0	1.60	0.42	1 10.5
	6	21 58 5.49	13.195	13 9 39.9	70.65	1.321 9933	690.3	1.60	0.42	0 55.7
	10	21 58 58.47	+13.287	−13 4 56.1	+71.20	1.322 2230	+ 458.0	1.60	0.42	0 40.8
	14	21 59 51.73	13.336	13 0 10.6	71.51	1.322 3597	+ 225.7	1.60	0.42	0 26.0
	18	22 0 45.10	13.341	12 55 24.3	71.60	1.322 4036	− 6.4	1.60	0.42	0 11.1
	22	22 1 38.40	13.304	12 50 38.1	71.47	1.322 3546	238.7	1.60	0.42	23 52.6
	26	22 2 31.47	13.223	12 45 52.9	71.10	1.322 2127	470.5	1.60	0.42	23 37.7
lar.	2	22 3 24.12	+13.095	−12 41 9.7	+70.44	1.321 9784	− 701.0	1.60	0.42	23 22.9
	6	22 4 16.17	12.922	12 36 29.7	69.54	1.321 6524	927.7	1.60	0.42	23 8.0
	10	22 5 7.44	12.706	12 31 53.7	68.41	1.321 2369	1149.0	1.60	0.42	22 53.1
	14	22 5 57.76	12.448	12 27 22.7	67.05	1.320 7339	1365.2	1.60	0.42	22 38.2
	18	22 6 46.97	12.152	12 22 57.6	65.47	1.320 1455	1575.6	1.60	0.42	22 23.3
	22	22 7 34.93	+11.821	−12 18 39.2	+63.69	1.319 4742	−1779.8	1.61	0.42	22 8.4
	26	22 8 21.49	11.452	12 14 28.4	61.68	1.318 7224	1978.6	1.61	0.42	21 53.4
	30	22 9 6.49	11.043	12 10 26.1	59.43	1.317 8923	2170.0	1.61	0.42	21 38.4
ıpr.	3	22 9 49.78	10.593	12 6 33.3	56.95	1.316 9876	2352.2	1.62	0.42	21 23.4
	7	22 10 31.19	10.109	12 2 50.8	54.27	1.316 0119	2524.1	1.62	0.43	21 8.4
	11	22 11 10.61	+ 9.596	−11 59 19.4	+51.43	1.314 9697	−2685.4	1.62	0.43	20 53.3
	15	22 11 47.92	9.053	11 55 59.6	48.42	1.313 8650	2835.9	1.63	0.43	20 38.2
	19	22 12 23.00	8.483	11 52 52.3	45.21	1.312 7024	2975.8	1.63	0.43	20 23.0
	23	22 12 55.75	7.886	11 49 58.1	41.86	1.311 4858	3105.5	1.64	0.43	20 7.8
	27	22 13 26.05	7.261	11 47 17.6	38.37	1.310 2195	3223.0	1.64	0.43	19 52.6
lay	1	22 13 53.80	+ 6.607	−11 44 51.4	+34.70	1.308 9093	−3325.9	1.65	0.43	19 37.3
	5	22 14 18.88	5.934	11 42 40.3	30.84	1.307 5607	3414.1	1.65	0.43	19 22.0
	9	22 14 41.25	5.247	11 40 44.7	26.99	1.306 1799	3488.0	1.66	0.43	19 6.6
	13	22 15 0.83	4.540	11 39 4.5	23.06	1.304 7722	3547.7	1.66	0.44	18 51.2
	17	22 15 17.56	3.826	11 37 40.4	18.98	1.303 3437	3592.5	1.67	0.44	18 35.7
	21	22 15 31.42	+ 3.100	−11 36 32.7	+14.88	1.301 9002	−3622.4	1.67	0.44	18 20.2
	25	22 15 42.34	2.360	11 35 41.4	10.72	1.300 4478	3637.6	1.68	0.44	18 4.7
	29	22 15 50.29	1.613	11 35 7.0	6.50	1.298 9924	3635.4	1.68	0.44	17 49.1
'une	2	22 15 55.24	0.864	11 34 49.4	+ 2.29	1.297 5419	3614.8	1.69	0.44	17 33.4
	6	22 15 57.21	+ 0.120	11 34 48.6	− 1.87	1.296 1028	3577.6	1.70	0.45	17 17.7
	10	22 15 56.21	− 0.618	−11 35 4.3	− 5.98	1.294 6820	−3524.1	1.70	0.45	17 2.0
	14	22 15 52.28	1.345	11 35 36.4	10.05	1.293 2857	3454.4	1.71	0.45	16 46.2
	18	22 15 45.46	2.063	11 36 24.6	14.04	1.291 9206	3369.0	1.71	0.45	16 30.3
	22	22 15 35.79	2.770	11 37 28.6	17.94	1.290 5927	3267.0	1.72	0.45	16 14.4
	26	22 15 23.32	3.401	11 38 48.0	21.75	1.289 3093	3147.3	1.72	0.45	15 58.5
	30	22 15 8.13	− 4.129	−11 40 22.4	−25.41	1.288 0771	−3010.6	1.73	0.45	15 42.5
uly	4	22 14 50.33	− 4.765	−11 42 11.0	−28.86	1.286 9030	−2857.6	1.73	0.45	15 26.5

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension.	Var. per Day.	Apparent Declination.	Var. per Day.	Logarithm of Distance from Earth.	Var. per Day.	Semi-diameter.	Hor. Parallax.	Transit, Meridian of Greenwich.
	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	Noon.	
	h m s	s	° ′ ″	″			″	″	h m
July 4	22 14 50.33	−4.765	−11 42 11.0	−28.86	1.286 9030	−2857.6	1.73	0.45	15 26.5
8	22 14 30.05	5.371	11 44 13.0	32.11	1.285 7930	2689.6	1.74	0.46	15 10.4
12	22 14 7.41	5.942	11 46 27.6	35.15	1.284 7531	2508.8	1.74	0.46	14 54.3
16	22 13 42.56	6.479	11 48 53.9	37.97	1.283 7881	2314.2	1.74	0.46	14 38.1
20	22 13 15.63	6.978	11 51 31.1	40.59	1.282 9035	2106.9	1.75	0.46	14 22.0
24	22 12 46.79	−7.435	−11 54 18.3	−42.95	1.282 1043	−1886.5	1.75	0.46	14 5.8
28	22 12 16.21	7.846	11 57 14.3	45.00	1.281 3959	1654.1	1.75	0.46	13 49.5
Aug. 1	22 11 44.09	8.203	12 0 17.9	46.74	1.280 7824	1411.1	1.76	0.46	13 33.3
5	22 11 10.66	8.502	12 3 27.8	48.16	1.280 2681	1159.8	1.76	0.46	13 17.0
9	22 10 36.14	8.750	12 6 42.8	49.29	1.279 8553	903.6	1.76	0.46	13 0.7
13	22 10 0.73	−8.943	−12 10 1.7	−50.09	1.279 5460	− 641.6	1.76	0.46	12 44.3
17	22 9 24.67	9.081	12 13 23.1	50.58	1.279 3427	374.5	1.76	0.46	12 28.0
21	22 8 48.16	9.163	12 16 45.9	50.75	1.279 2469	− 103.8	1.76	0.46	12 11.7
25	22 8 11.45	9.179	12 20 8.6	50.54	1.279 2600	+ 169.5	1.76	0.46	11 55.3
29	22 7 34.81	9.131	12 23 29.8	50.01	1.279 3825	442.6	1.76	0.46	11 39.0
Sept. 2	22 6 58.48	−9.023	−12 26 48.2	−49.12	1.279 6137	+ 712.9	1.76	0.46	11 22.7
6	22 6 22.71	8.852	12 30 2.3	47.90	1.279 9522	978.5	1.76	0.46	11 6.4
10	22 5 47.74	8.626	12 33 11.0	46.41	1.280 3958	1238.9	1.76	0.46	10 50.1
14	22 5 13.78	8.343	12 36 13.2	44.63	1.280 9425	1493.0	1.76	0.46	10 33.8
18	22 4 41.07	8.004	12 39 7.6	42.52	1.281 5893	1740.4	1.75	0.46	10 17.5
22	22 4 9.82	−7.611	−12 41 53.0	−40.13	1.282 3337	+1979.5	1.75	0.46	10 1.3
26	22 3 40.26	7.160	12 44 28.3	37.47	1.283 1715	2207.9	1.75	0.46	9 45.1
30	22 3 12.61	6.657	12 46 52.4	34.54	1.284 0983	2423.2	1.74	0.46	9 28.9
Oct. 4	22 2 47.06	6.111	12 49 4.3	31.40	1.285 1081	2623.7	1.74	0.46	9 12.7
8	22 2 23.78	5.522	12 51 3.3	28.05	1.286 1953	2809.6	1.73	0.46	8 56.6
12	22 2 2.93	−4.901	−12 52 48.5	−24.55	1.287 3539	+2981.6	1.73	0.45	8 40.5
16	22 1 44.62	4.245	12 54 19.5	20.88	1.288 5786	3138.9	1.72	0.45	8 24.5
20	22 1 29.02	3.551	12 55 35.3	17.02	1.289 8628	3279.5	1.72	0.45	8 8.5
24	22 1 16.25	2.829	12 56 35.5	13.04	1.291 1999	3403.3	1.71	0.45	7 52.6
28	22 1 6.42	2.083	12 57 19.5	8.96	1.292 5829	3507.8	1.71	0.45	7 36.7
Nov. 1	22 0 59.61	−1.321	−12 57 47.1	− 4.81	1.294 0036	+3592.8	1.70	0.45	7 20.9
5	22 0 55.87	−0.546	12 57 57.9	− 0.59	1.295 4547	3659.8	1.70	0.45	7 5.1
9	22 0 55.25	+0.234	12 57 51.8	+ 3.64	1.296 9291	3709.2	1.69	0.44	6 49.4
13	22 0 57.75	1.019	12 57 28.8	7.86	1.298 4197	3741.1	1.69	0.44	6 33.7
17	22 1 3.41	1.809	12 56 48.9	12.12	1.299 9196	3755.5	1.68	0.44	6 18.1
21	22 1 12.22	+2.598	−12 55 51.8	+16.40	1.301 4216	+3751.3	1.67	0.44	6 2.5
25	22 1 24.19	3.383	12 54 37.8	20.58	1.302 9181	3727.9	1.67	0.44	5 47.0
29	22 1 39.27	4.154	12 53 7.2	24.73	1.304 4015	3686.2	1.66	0.44	5 31.5
Dec. 3	22 1 57.40	4.907	12 51 20.1	28.77	1.305 8648	3627.4	1.66	0.43	5 16.1
7	22 2 18.50	5.641	12 49 17.2	32.69	1.307 3014	3553.5	1.65	0.43	5 0.7
11	22 2 42.50	+6.354	−12 46 58.7	+36.53	1.308 7056	+3464.9	1.65	0.43	4 45.4
15	22 3 9.30	7.044	12 44 25.1	40.26	1.310 0713	3361.2	1.64	0.43	4 30.1
19	22 3 38.82	7.712	12 41 36.8	43.87	1.311 3926	3242.7	1.64	0.43	4 14.8
23	22 4 10.96	8.351	12 38 34.4	47.30	1.312 6635	3109.4	1.63	0.43	3 59.6
27	22 4 45.58	8.954	12 35 18.6	50.57	1.313 8783	2962.4	1.63	0.43	3 44.5
31	22 5 22.54	+9.520	−12 31 50.1	+53.65	1.315 0318	+2803.0	1.62	0.43	3 29.4

FOR GREENWICH MEAN NOON.

Date.		Heliocentric Longitude, Mean Equinox of Date.	Var. per Day.	Reduction to Orbit.	Heliocentric Latitude.	Var. per Day.	Logarithm of Radius Vector.	Var. per Day.
		° ′ ″	″	″	° ′ ″	″		
n.	5	327 13 42.2	38.84	+5.0	−0 44 27.9	−0.15	1.301 4170	+14.2
	15	327 20 10.6	38.84	5.0	0 44 29.4	0.15	1.301 4312	14.2
	25	327 26 38.9	38.83	5.0	0 44 30.8	0.15	1.301 4454	14.2
b.	4	327 33 7.2	38.83	+5.0	−0 44 32.3	−0.15	1.301 4595	+14.1
	14	327 39 35.5	38.82	4.9	0 44 33.7	0.14	1.301 4736	14.1
	24	327 46 3.7	38.82	4.9	0 44 35.1	0.14	1.301 4877	14.0
r.	6	327 52 31.9	38.82	+4.9	−0 44 36.5	−0.14	1.301 5017	+14.0
	16	327 59 0.1	38.82	4.9	0 44 37.9	0.14	1.301 5156	13.9
	26	328 5 28.2	38.81	4.8	0 44 39.3	0.14	1.301 5295	13.8
r.	5	328 11 56.3	38.81	+4.8	−0 44 40.7	−0.14	1.301 5433	+13.8
	15	328 18 24.4	38.81	4.8	0 44 42.1	0.14	1.301 5570	13.7
	25	328 24 52.5	38.80	4.7	0 44 43.5	0.14	1.301 5707	13.6
y	5	328 31 20.5	38.80	+4.7	−0 44 44.8	−0.14	1.301 5843	+13.6
	15	328 37 48.5	38.80	4.7	0 44 46.2	0.13	1.301 5979	13.6
	25	328 44 16.4	38.79	4.6	0 44 47.5	0.13	1.301 6114	13.5
ne	4	328 50 44.3	38.79	+4.6	−0 44 48.8	−0.13	1.301 6249	+13.5
	14	328 57 12.2	38.79	4.6	0 44 50.1	0.13	1.301 6384	13.4
	24	329 3 40.1	38.78	4.6	0 44 51.4	0.13	1.301 6517	13.3
ly	4	329 10 7.9	38.78	+4.5	−0 44 52.7	−0.13	1.301 6649	+13.3
	14	329 16 35.7	38.78	4.5	0 44 54.0	0.13	1.301 6782	13.2
	24	329 23 3.5	38.78	4.5	0 44 55.3	0.13	1.301 6914	13.2
ug.	3	329 29 31.3	38.78	+4.4	−0 44 56.6	−0.13	1.301 7045	+13.1
	13	329 35 59.0	38.77	4.4	0 44 57.8	0.13	1.301 7175	13.0
	23	329 42 26.7	38.77	4.4	0 44 59.1	0.13	1.301 7305	13.0
pt.	2	329 48 54.4	38.76	+4.3	−0 45 0.3	−0.12	1.301 7435	+12.9
	12	329 55 22.0	38.76	4.3	0 45 1.6	0.12	1.301 7564	12.8
	22	330 1 49.6	38.76	4.3	0 45 2.8	0.12	1.301 7692	12.8
ct.	2	330 8 17.2	38.76	+4.2	−0 45 4.0	−0.12	1.301 7820	+12.7
	12	330 14 44.7	38.76	4.2	0 45 5.2	0.12	1.301 7947	12.7
	22	330 21 12.3	38.75	4.2	0 45 6.4	0.12	1.301 8074	12.6
v.	1	330 27 39.8	38.75	+4.2	−0 45 7.6	−0.12	1.301 8200	+12.6
	11	330 34 7.3	38.75	4.1	0 45 8.8	0.12	1.301 8326	12.5
	21	330 40 34.7	38.74	4.1	0 45 9.9	0.12	1.301 8451	12.4
c.	1	330 47 2.1	38.74	+4.1	−0 45 11.1	−0.12	1.301 8575	+12.4
	11	330 53 29.5	38.74	4.0	0 45 12.2	0.11	1.301 8699	12.4
	21	330 59 56.9	38.74	4.0	0 45 13.4	0.11	1.301 8822	12.3
	31	331 6 24.2	38.73	+4.0	−0 45 14.5	−0.11	1.301 8945	+12.2
	41	331 12 51.5	38.73	+3.9	−0 45 15.6	−0.11	1.301 9067	+12.1

GREENWICH MEAN TIME.

Date.		Apparent Right Ascension. Noon.	Var. per Day. Noon.	Apparent Declination. Noon.	Var. per Day. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Day. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
		h m s	s	° ′ ″	″			″	″	h m
Jan.	1	8 44 18.49	−5.805	+18 0 12.1	+23.05	1.465 0830	−1236.1	1.32	0.30	14 1.6
	5	8 43 54.70	6.086	18 1 46.4	24.09	1.464 6214	1069.8	1.33	0.30	13 45.5
	9	8 43 29.86	6.324	18 3 24.6	24.97	1.464 2280	897.0	1.33	0.30	13 29.3
	13	8 43 4.17	6.514	18 5 5.9	25.65	1.463 9042	721.6	1.33	0.30	13 13.2
	17	8 42 37.80	6.667	18 6 49.6	26.17	1.463 6512	542.5	1.33	0.30	12 57.0
	21	8 42 10.89	−6.778	+18 8 35.1	+26.57	1.463 4707	− 359.1	1.33	0.30	12 40.9
	25	8 41 43.63	6.846	18 10 21.9	26.78	1.463 3642	− 173.4	1.33	0.30	12 24.7
	29	8 41 16.18	6.869	18 12 9.1	26.82	1.463 3321	+ 12.8	1.33	0.30	12 8.5
Feb.	2	8 40 48.74	6.841	18 13 56.2	26.67	1.463 3745	199.8	1.33	0.30	11 52.3
	6	8 40 21.49	6.772	18 15 42.2	26.31	1.463 4917	384.6	1.33	0.30	11 36.1
	10	8 39 54.62	−6.657	+18 17 26.5	+25.82	1.463 6817	+ 565.7	1.33	0.30	11 19.9
	14	8 39 28.29	6.498	18 19 8.6	25.19	1.463 9438	743.9	1.33	0.30	11 3.8
	18	8 39 2.69	6.299	18 20 47.8	24.40	1.464 2761	916.4	1.33	0.30	10 47.6
	22	8 38 37.95	6.065	18 22 23.6	23.47	1.464 6762	1083.4	1.33	0.30	10 31.5
	26	8 38 14.23	5.786	18 23 55.4	22.40	1.465 1421	1245.5	1.32	0.30	10 15.4
Mar.	2	8 37 51.71	−5.471	+18 25 22.6	+21.18	1.465 6716	+1399.9	1.32	0.30	9 59.3
	6	8 37 30.51	5.121	18 26 44.7	19.83	1.466 2608	1545.0	1.32	0.30	9 43.2
	10	8 37 10.79	4.736	18 28 1.1	18.38	1.466 9064	1681.2	1.32	0.30	9 27.1
	14	8 36 52.66	4.325	18 29 11.6	16.84	1.467 6044	1806.8	1.32	0.30	9 11.1
	18	8 36 36.22	3.892	18 30 15.7	15.20	1.468 3505	1922.4	1.31	0.30	8 55.1
	22	8 36 21.56	−3.432	+18 31 13.1	+13.50	1.469 1410	+2028.2	1.31	0.30	8 39.1
	26	8 36 8.79	2.952	18 32 3.6	11.72	1.469 9716	2123.1	1.31	0.30	8 23.2
	30	8 35 57.97	2.453	18 32 46.8	9.87	1.470 8380	2206.8	1.31	0.30	8 7.3
Apr.	3	8 35 49.19	1.936	18 33 22.5	7.96	1.471 7355	2278.9	1.30	0.30	7 51.4
	7	8 35 42.50	1.407	18 33 50.4	5.99	1.472 6594	2337.7	1.30	0.30	7 35.6
	11	8 35 37.94	−0.873	+18 34 10.4	+ 4.04	1.473 6041	+2385.0	1.30	0.30	7 19.8
	15	8 35 35.52	−0.334	18 34 22.7	2.08	1.474 5659	2421.1	1.30	0.29	7 4.1
	19	8 35 35.27	+0.207	18 34 27.0	+ 0.08	1.475 5394	2444.7	1.29	0.29	6 48.3
	23	8 35 37.18	0.750	18 34 23.3	− 1.93	1.476 5203	2458.4	1.29	0.29	6 32.6
	27	8 35 41.27	1.294	18 34 11.6	3.93	1.477 5046	2460.7	1.29	0.29	6 17.0
May	1	8 35 47.53	+1.835	+18 33 51.9	− 5.92	1.478 4872	+2450.4	1.28	0.29	6 1.4
	5	8 35 55.94	2.368	18 33 24.3	7.88	1.479 4634	2428.7	1.28	0.29	5 45.8
	9	8 36 6.46	2.890	18 32 48.9	9.82	1.480 4287	2396.0	1.28	0.29	5 30.2
	13	8 36 19.04	3.399	18 32 5.8	11.72	1.481 3789	2353.5	1.28	0.29	5 14.7
	17	8 36 33.63	3.894	18 31 15.2	13.57	1.482 3103	2301.9	1.27	0.29	4 59.2
	21	8 36 50.17	+4.373	+18 30 17.3	−15.37	1.483 2192	+2240.9	1.27	0.29	4 43.8
	25	8 37 8.60	4.842	18 29 12.3	17.13	1.484 1018	2170.6	1.27	0.29	4 28.3
	29	8 37 28.88	5.293	18 28 0.3	18.86	1.484 9545	2091.4	1.27	0.29	4 12.9
June	2	8 37 50.91	5.719	18 26 41.5	20.50	1.485 7737	2002.7	1.26	0.29	3 57.6
	6	8 38 14.60	6.124	18 25 16.4	22.05	1.486 5556	1905.8	1.26	0.29	3 42.3
	10	8 38 39.87	+6.507	+18 23 45.2	−23.54	1.487 2975	+1802.6	1.26	0.29	3 27.0
	14	8 39 6.62	6.863	18 22 8.2	24.96	1.487 9969	1693.4	1.26	0.29	3 11.7
	18	8 39 34.74	7.195	18 20 25.6	26.30	1.488 6514	1577.9	1.25	0.29	2 56.4
	22	8 40 4.15	7.507	18 18 37.9	27.55	1.489 2584	1456.5	1.25	0.29	2 41.2
	26	8 40 34.76	7.792	18 16 45.3	28.73	1.489 8157	1328.2	1.25	0.28	2 25.9
	30	8 41 6.45	+8.049	+18 14 48.2	−29.70	1.490 3203	+1195.2	1.25	0.28	2 10.7
July	*4*	*8 41 39.11*	+8.275	+18 12 47.1	−30.74	1.490 7713	+1058.3	1.25	0.28	1 55.6

GREENWICH MEAN TIME.

Date.	Apparent Right Ascension. Noon.	Var. per Day. Noon.	Apparent Declination. Noon.	Var. per Day. Noon.	Logarithm of Distance from Earth. Noon.	Var. per Day. Noon.	Semi-diameter. Noon.	Hor. Parallax. Noon.	Transit, Meridian of Greenwich.
	h m s	s	° ′ ″	″			″	″	h m
July 4	8 41 39.11	+8.275	+18 12 47.1	−30.74	1.490 7713	+1058.3	1.25	0.28	1 55.6
8	8 42 12.61	8.469	18 10 42.4	31.60	1.491 1664	917.1	1.25	0.28	1 40.4
12	8 42 46.83	8.638	18 8 34.4	32.37	1.491 5046	773.4	1.25	0.28	1 25.2
16	8 43 21.68	8.778	18 6 23.6	33.02	1.491 7848	627.2	1.25	0.28	1 10.1
20	8 43 57.02	8.890	18 4 10.4	33.58	1.492 0060	478.3	1.25	0.28	0 54.9
24	8 44 32.76	+8.974	+18 1 55.1	−34.03	1.492 1671	+ 327.1	1.24	0.28	0 39.8
28	8 45 8.77	9.026	17 59 38.3	34.35	1.492 2674	173.8	1.24	0.28	0 24.7
Aug. 1	8 45 44.92	9.043	17 57 20.5	34.53	1.492 3060	+ 19.7	1.24	0.28	0 9.5
5	8 46 21.07	9.028	17 55 2.2	34.60	1.492 2832	− 134.0	1.24	0.28	23 50.6
9	8 46 57.11	8.986	17 52 43.8	34.58	1.492 1989	287.0	1.24	0.28	23 35.5
13	8 47 32.92	+8.915	+17 50 25.7	−34.42	1.492 0538	− 438.4	1.24	0.28	23 20.3
17	8 48 8.39	8.814	17 48 8.6	34.13	1.491 8483	589.3	1.25	0.28	23 5.2
21	8 48 43.39	8.683	17 45 52.8	33.75	1.491 5825	739.2	1.25	0.28	22 50.0
25	8 49 17.81	8.520	17 43 38.8	33.22	1.491 2572	887.0	1.25	0.28	22 34.9
29	8 49 51.51	8.326	17 41 27.2	32.54	1.490 8733	1032.0	1.25	0.28	22 19.7
Sept. 2	8 50 24.38	+8.102	+17 39 18.6	−31.76	1.490 4322	−1172.5	1.25	0.28	22 4.6
6	8 50 56.29	7.849	17 37 13.3	30.84	1.489 9359	1308.2	1.25	0.28	21 49.4
10	8 51 27.14	7.570	17 35 12.0	29.82	1.489 3862	1439.7	1.25	0.29	21 34.1
14	8 51 56.82	7.267	17 33 14.9	28.70	1.488 7848	1566.3	1.25	0.29	21 18.9
18	8 52 25.24	6.937	17 31 22.6	27.43	1.488 1339	1687.2	1.26	0.29	21 3.6
22	8 52 52.28	+6.578	+17 29 35.6	−26.04	1.487 4358	−1802.5	1.26	0.29	20 48.3
26	8 53 17.83	6.191	17 27 54.4	24.54	1.486 6928	1911.1	1.26	0.29	20 33.0
30	8 53 41.78	5.781	17 26 19.4	22.93	1.485 9080	2011.2	1.26	0.29	20 17.7
Oct. 4	8 54 4.05	5.351	17 24 51.1	21.21	1.485 0850	2102.8	1.27	0.29	20 2.3
8	8 54 24.56	4.900	17 23 29.8	19.43	1.484 2269	2185.6	1.27	0.29	19 46.9
12	8 54 43.23	+4.433	+17 22 15.8	−17.55	1.483 3377	−2259.4	1.27	0.29	19 31.5
16	8 55 0.00	3.947	17 21 9.5	15.59	1.482 4205	2325.3	1.27	0.29	19 16.1
20	8 55 14.78	3.443	17 20 11.2	13.53	1.481 4788	2380.8	1.28	0.29	19 0.6
24	8 55 27.52	2.923	17 19 21.3	11.42	1.480 5173	2425.6	1.28	0.29	18 45.1
28	8 55 38.15	2.391	17 18 39.9	9.25	1.479 5399	2458.6	1.28	0.29	18 29.5
Nov. 1	8 55 46.64	+1.851	+17 18 7.4	− 7.01	1.478 5520	−2479.4	1.28	0.29	18 13.9
5	8 55 52.95	1.305	17 17 43.8	4.77	1.477 5579	2489.0	1.29	0.29	17 58.3
9	8 55 57.08	0.760	17 17 29.2	2.54	1.476 5623	2487.2	1.29	0.29	17 42.6
13	8 55 59.02	+0.208	17 17 23.5	− 0.26	1.475 5697	2474.0	1.29	0.29	17 26.9
17	8 55 58.74	−0.346	17 17 27.1	+ 2.03	1.474 5848	2448.1	1.30	0.29	17 11.2
21	8 55 56.26	−0.895	+17 17 39.7	+ 4.29	1.473 6129	−2409.6	1.30	0.30	16 55.4
25	8 55 51.59	1.438	17 18 1.4	6.55	1.472 6588	2358.5	1.30	0.30	16 39.6
29	8 55 44.77	1.972	17 18 32.0	8.74	1.471 7279	2293.2	1.30	0.30	16 23.7
Dec. 3	8 55 35.84	2.487	17 19 11.2	10.83	1.470 8258	2216.2	1.31	0.30	16 7.8
7	8 55 24.90	2.982	17 19 58.6	12.87	1.469 9564	2128.3	1.31	0.30	15 51.9
11	8 55 12.00	−3.466	+17 20 54.1	+14.87	1.469 1246	−2029.4	1.31	0.30	15 36.0
15	8 54 57.20	3.931	17 21 57.4	16.76	1.468 3344	1919.0	1.32	0.30	15 20.0
19	8 54 40.59	4.369	17 23 8.0	18.52	1.467 5909	1797.0	1.32	0.30	15 4.0
23	8 54 22.29	4.778	17 24 25.4	20.17	1.466 8982	1664.5	1.32	0.30	14 48.0
27	8 54 2.41	5.156	17 25 49.2	21.69	1.466 2607	1521.4	1.32	0.30	14 31.9
31	8 53 41.09	−5.498	+17 27 18.7	+23.04	1.465 6822	−1369.8	1.32	0.30	14 15.8

PART II.

ASTRONOMICAL EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

The constants of precession, nutation and aberration adopted by the *Conférence Internationale des Étoiles Fondamentales* which met in Paris in May, 1896, are given on page xvi, and together with the notation of BESSEL are used in the formulæ which follow.

BESSELIAN STAR-NUMBERS.

Terms of Long Period.	*Terms of Short Period.*
$A = \tau - 0.342\,21 \sin ☊$	$-0.004\,05 \sin 2\,☾$
$+\,0.004\,15 \sin 2\,☊$	$+0.000\,23 \sin (☾+\Gamma')$
$-\,0.025\,26 \sin 2\,L$	$+0.001\,34 \sin (☾-\Gamma')$
$+\,0.002\,51 \sin (L-\Gamma)$	$-0.000\,68 \sin (2\,☾-☊)$
$-\,0.000\,99 \sin (3\,L-\Gamma)$	$-0.000\,52 \sin (3\,☾-\Gamma')$
$+\,0.000\,42 \sin (L+\Gamma)$	$+0.000\,30 \sin (☾-2\,L+\Gamma')$
$+\,0.000\,25 \sin (2\,L-☊)$	$+0.000\,12 \sin 2\,(☾-L)$
$''$	$''$
$B = -\,9.210 \cos ☊$	$-0.088 \cos 2\,☾$
$+\,0.090 \cos 2\,☊$	$-0.018 \cos (2\,☾-☊)$
$-\,0.551 \cos 2\,L$	$-0.011 \cos (3\,☾-\Gamma')$
$-\,0.022 \cos (3\,L-\Gamma)$	$+0.005 \cos (☾+\Gamma')$
$+\,0.009 \cos (L+\Gamma)$	
$+\,0.007 \cos (2\,L-☊)$	

$C = -20.4700 \cos \omega \cos ☉$

$D = -20.4700 \sin ☉$

$E = -\,0.0415 \sin ☊ + 0''.0005 \sin 2\,☊ - 0''.0031 \sin 2\,L$

BESSEL'S *Star-Constants.*

$a = 3^s.072\,69 + 1^s.336\,35 \sin \alpha_0 \tan \delta_0$	$a' = 20''.0452 \cos \alpha_0$
$b = \frac{1}{15} \cos \alpha_0 \tan \delta_0$	$b' = -\sin \alpha_0$
$c = \frac{1}{15} \cos \alpha_0 \sec \delta_0$	$c' = \tan \omega \cos \delta_0 - \sin \alpha_0 \sin \delta_0$
$d = \frac{1}{15} \sin \alpha_0 \sec \delta_0$	$d' = \cos \alpha_0 \sin \delta_0$

Formulæ for Reduction to Apparent Position.

$$\alpha = \alpha_0 + \tau\mu + Aa + Bb + Cc + Dd + \tfrac{1}{15}E \quad \text{(in time)}$$
$$\delta = \delta_0 + \tau\mu' + Aa' + Bb' + Cc' + Dd' \quad \text{(in arc)}$$

INDEPENDENT STAR-NUMBERS.

$$f + f' = +46''.0903\,A + E \quad \text{(in arc)}$$
$$= +3^s.07269 A + \tfrac{1}{15}E \quad \text{(in time)}$$
$$f' = -0^s.0124 \sin 2\,☾ + 0^s.0041 \sin (☾-\Gamma') + 0^s.0007 \sin (☾+\Gamma')$$
$$-0^s.0021 \sin (2\,☾-☊) - 0^s.0016 \sin (3\,☾-\Gamma')$$
$$+0^s.0009 \sin (☾-2\,L+\Gamma') + 0^s.0004 \sin 2\,(☾-L)$$

$g \sin G = B$	$h \sin H = C$	$i = C \tan \omega$
$g \cos G = 20''.0452\,A$	$h \cos H = D$	

Formulæ for Reduction to Apparent Position.

$$\alpha = \alpha_0 + f + f' + \tau\mu + \tfrac{1}{15}\,g \sin (G+\alpha_0) \tan \delta_0 + \tfrac{1}{15}\,h \sin (H+\alpha_0) \sec \delta_0 \quad \text{(in time)}$$
$$\delta = \delta_0 + \tau\mu' + g \cos (G+\alpha_0) + h \cos (H+\alpha_0) \sin \delta_0 + i \cos \delta_0 \quad \text{(in arc)}$$

In the above formulæ,

τ denotes the time reckoned in units of one year, from the beginning of the Besselian fictitious year (1919, January $0^d.701$, Washington mean time),

α_0, δ_0, the star's mean R. A. and Decl. at the beginning of the fictitious year,

α, δ, the star's apparent right ascension and declination at the time τ,

μ, μ', the annual proper motion in right ascension and declination,

☉, the Sun's true longitude,

L, the Sun's mean longitude,

☊, the longitude of the Moon's *ascending node*,

ω, the obliquity of the ecliptic,

Γ, the long. of the Sun's perigee,

Γ', the long. of the Moon's perigee,

☾, the Moon's mean longitude.

The independent star-numbers are more convenient than BESSEL's when only one or two apparent positions of a star are required, or when BESSEL's star-constants are not known with sufficient accuracy.

In using the star-constants of the *British Association Catalogue*, a, b, c, d, a', b', c', d', with the star-numbers of this Ephemeris, the quantities to be computed are Ac, Bd, Ca, Db, $-Ac'$, $-Bd'$, $-Ca'$, $-Db'$.

In the computation of the Besselian star-numbers given for Washington mean midnight of each day of the year, on pages 202–205, the short-period terms—that is, the terms involving the Moon's mean longitude—have been included.

In the computation of the independent star-numbers, pages 206–213, the short-period terms have been included in the two columns headed G and Log g. The quantities f and f' give separately the effect of the long-period and short-period terms. f' differs but slightly from the quantity $-0''.1866 \sin 2 ☾ + 0''.0622 \sin (☾ - \Gamma')$ given on page 37 of the *Procès-Verbaux* of the Paris Conference of 1896, which quantity that conference decided should be omitted in the reduction of stars from mean to apparent place.

In computing the ephemerides of the circumpolar stars in this volume, all short-period terms have been included. The quantity f', which was omitted from the ephemerides of the circumpolar stars given in the *American Ephemeris and Nautical Almanac* for the years 1900 to 1915, inclusive, is now included in these ephemerides in accordance with the decision of the *Congrès International des Éphémérides Astronomiques* held in Paris in October, 1911. See page 43 of *Procès-Verbaux* of that Congress.

In the computation of the ephemerides of the ten-day stars, no short-period terms have been included. These terms attain two maxima and two minima during the tropical month. At maximum and minimum they may amount in right ascension to $\pm 0^s.008 \tan \delta$, and in declination to $\pm 0''.13$. For computing the effect of these terms for the correction of the positions of stars interpolated from the ten-day ephemerides, the following formulæ may be used, in which $\Delta\alpha$ and $\Delta\delta$ denote the effect of the short-period terms in right ascension and declination, respectively, and $\delta''\psi$ and $\delta''\omega$, the sum of the short-period terms of the nutation in longitude and obliquity:

$$\Delta\alpha = D_\psi\alpha \; \delta''\psi + D_\omega\alpha \; \delta''\omega$$
$$\Delta\delta = D_\psi\delta \; \delta''\psi + D_\omega\delta \; \delta''\omega$$

The values of $\delta''\psi$ and of $\delta''\omega$ for Washington mean midnight are given for each day of the year on pages 215–216, and have been computed as follows:

$$\delta''\psi = 50''.37 \, A_2 \qquad \delta''\omega = -B_2$$

in which A_2 and B_2 are the sums of the short-period terms given in the expressions for A and B on page 200.

The quantities $D_\psi\alpha$, $D_\omega\alpha$, $D_\psi\delta$, and $D_\omega\delta$ are given for each ten-day star on pages 316–513, and have been computed by means of the following formulæ:

$$D_\psi\alpha = \tfrac{1}{15} (\cos \omega + \sin \alpha \tan \delta \sin \omega) \qquad D_\omega\alpha = -\tfrac{1}{15} \cos \alpha \tan \delta$$
$$D_\psi\delta = \cos \alpha \sin \omega \qquad D_\omega\delta = \sin \alpha$$

In the *Star List of the American Ephemeris* for the years 1910 and 1911 and in the *American Ephemeris and Nautical Almanac* for the years 1912 to 1915, inclusive, the value used for the derivative of the right ascension with reference to ψ was

$$D'_\psi\alpha = \tfrac{1}{15} \sin \alpha \tan \delta \sin \omega$$

and the addition of the term $\frac{1}{15} \cos \omega$ is made in accordance with the above-mentioned decision of the *Congrès International des Éphémérides* Astronomiques of 1911 with reference to the quantity f'.

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Jan. 0	+9.52419	+0.5360	−0.50242	+1.30480
1	9.53075	0.5351	0.54517	1.30340
2	9.53696	0.5321	0.58395	1.30186
3	9.54237	0.5277	0.61943	1.30018
4	9.54678	0.5224	0.65209	1.29835
h (7.0) 5	+9.55007	+0.5177	−0.68234	+1.29637
6	9.55245	0.5146	0.71048	1.29425
7	9.55444	0.5141	0.73679	1.29198
8	9.55659	0.5162	0.76145	1.28956
9	9.55941	0.5205	0.78466	1.28698
10	+9.56336	+0.5257	−0.80655	+1.28426
11	9.56850	0.5304	0.82726	1.28138
12	9.57446	0.5332	0.84690	1.27834
13	9.58081	0.5336	0.86554	1.27515
14	9.58693	0.5310	0.88329	1.27179
15	+9.59230	+0.5262	−0.90021	+1.26827
16	9.59666	0.5201	0.91635	1.26458
17	9.59991	0.5139	0.93178	1.26072
18	9.60225	0.5088	0.94655	1.25669
19	9.60397	0.5053	0.96070	1.25249
h (8.0) 20	+9.60541	+0.5039	−0.97427	+1.24810
21	9.60693	0.5045	0.98730	1.24354
22	9.60878	0.5064	0.99980	1.23879
23	9.61111	0.5091	1.01183	1.23385
24	9.61401	0.5120	1.02340	1.22871
25	+9.61749	+0.5144	−1.03452	+1.22337
26	9.62150	0.5159	1.04524	1.21783
27	9.62588	0.5158	1.05557	1.21208
28	9.63043	0.5138	1.06552	1.20611
29	9.63480	0.5098	1.07511	1.19993
30	+9.63871	+0.5040	−1.08436	+1.19352
31	9.64187	0.4971	1.09327	1.18688
Feb. 1	9.64417	0.4903	1.10187	1.17999
2	9.64568	0.4849	1.11017	1.17286
3	9.64668	0.4819	1.11818	1.16548
h 4	+9.64764	+0.4820	−1.12591	+1.15783
(9.0) 5	9.64899	0.4847	1.13336	1.14990
6	9.65111	0.4890	1.14055	1.14170
7	9.65420	0.4935	1.14749	1.13321
8	9.65806	0.4965	1.15418	1.12441
9	+9.66238	+0.4970	−1.16064	+1.11529
10	9.66671	0.4945	1.16686	1.10584
11	9.67057	0.4894	1.17286	1.09605
12	9.67367	0.4825	1.17864	1.08590
13	9.67586	0.4751	1.18421	1.07538
14	+9.67724	+0.4685	−1.18958	+1.06446
15	+9.67801	+0.4638	−1.19474	+1.05312

Solar Day. (Sid. Hr.)	Log A.	Log B.	Log C.	Log D.
Feb. 15	+9.67801	+0.4638	−1.19474	+1.05312
16	9.67846	0.4614	1.19971	1.04134
17	9.67894	0.4613	1.20448	1.02911
18	9.67966	0.4630	1.20907	1.01638
19	9.68074	0.4660	1.21348	1.00314
h (10.0) 20	+9.68228	+0.4693	−1.21771	+0.98934
21	9.68432	0.4725	1.22176	0.97496
22	9.68687	0.4748	1.22564	0.95996
23	9.68985	0.4757	1.22936	0.94428
24	9.69298	0.4747	1.23290	0.92789
25	+9.69608	+0.4717	−1.23628	+0.91072
26	9.69886	0.4667	1.23951	0.89271
27	9.70104	0.4604	1.24258	0.87379
28	9.70254	0.4538	1.24549	0.85388
Mar. 1	9.70343	0.4484	1.24824	0.83288
2	+9.70384	+0.4453	−1.25085	+0.81069
3	9.70406	0.4455	1.25331	0.78717
4	9.70451	0.4489	1.25562	0.76218
5	9.70557	0.4545	1.25778	0.73554
6	9.70742	0.4609	1.25980	0.70703
h (11.0) 7	+9.71006	+0.4663	−1.26168	+0.67639
8	9.71324	0.4695	1.26342	0.64331
9	9.71657	0.4696	1.26501	0.60738
10	9.71959	0.4668	1.26647	0.56808
11	9.72206	0.4618	1.26779	0.52475
12	+9.72376	+0.4559	−1.26898	+0.47650
13	9.72469	0.4506	1.27003	0.42210
14	9.72502	0.4470	1.27095	0.35977
15	9.72502	0.4459	1.27173	0.28688
16	9.72498	0.4473	1.27238	0.19913
17	+9.72514	+0.4509	−1.27290	+0.08894
18	9.72560	0.4559	1.27329	9.94080
19	9.72649	0.4616	1.27354	9.71423
20	9.72784	0.4672	1.27367	+9.21259
21	9.72967	0.4722	1.27366	−9.28202
h (12.0) 22	+9.73184	+0.4759	−1.27353	−9.73692
23	9.73429	0.4779	1.27326	9.95411
24	9.73678	0.4779	1.27286	0.09803
25	9.73915	0.4761	1.27234	0.20582
26	9.74112	0.4728	1.27168	0.29195
27	+9.74257	+0.4689	−1.27090	−0.36364
28	9.74343	0.4657	1.26998	0.42502
29	9.74376	0.4645	1.26893	0.47866
30	9.74391	0.4663	1.26775	0.52625
31	9.74418	0.4710	1.26644	0.56900
Apr. 1	+9.74490	+0.4783	−1.26500	−0.60776
2	+9.74638	+0.4867	−1.26342	−0.64322

$E = +0''.04 = +0^s.003$

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log *A*.	Log *B*.	Log *C*.	Log *D*.	Solar Day. (Sid. Hr.)	Log *A*.	Log *B*.	Log *C*.	Log *D*.
Apr. 1	+9.74490	+0.4783	−1.26500	−0.60776	May 17	+9.82266	+0.6223	−1.01880	−1.23080
2	9.74638	0.4867	1.26342	0.64322	18	9.82534	0.6233	1.00769	1.23559
3	9.74860	0.4946	1.26171	0.67586	19	9.82785	0.6231	0.99617	1.24021
4	9.75140	0.5008	1.25986	0.70608	20	9.83000	0.6220	0.98421	1.24465
5	9.75452	0.5043	1.25788	0.73419	h 21	9.83169	0.6206	0.97180	1.24893
h 6	+9.75751	+0.5049	−1.25577	−0.76045	(16.0) 22	+9.83293	+0.6200	−0.95889	−1.25305
(13.0) 7	9.76007	0.5033	1.25351	0.78508	23	9.83384	0.6208	0.94547	1.25700
8	9.76193	0.5004	1.25112	0.80826	24	9.83470	0.6236	0.93150	1.26080
9	9.76306	0.4976	1.24859	0.83012	25	9.83577	0.6284	0.91694	1.26444
10	9.76363	0.4962	1.24591	0.85080	26	9.83734	0.6345	0.90175	1.26793
11	+9.76382	+0.4967	−1.24309	−0.87041	27	+9.83953	+0.6410	−0.88589	−1.27127
12	9.76389	0.4996	1.24013	0.88904	28	9.84235	0.6468	0.86931	1.27446
13	9.76411	0.5045	1.23702	0.90677	29	9.84562	0.6510	0.85195	1.27751
14	9.76461	0.5108	1.23376	0.92367	30	9.84903	0.6531	0.83374	1.28041
15	9.76553	0.5178	1.23036	0.93981	31	9.85227	0.6532	0.81462	1.28317
16	+9.76690	+0.5248	−1.22680	−0.95524	June 1	+9.85505	+0.6517	−0.79450	−1.28580
17	9.76865	0.5312	1.22308	0.97001	2	9.85725	0.6496	0.77328	1.28828
18	9.77079	0.5367	1.21921	0.98416	3	9.85886	0.6478	0.75085	1.29063
19	9.77319	0.5408	1.21518	0.99774	4	9.86000	0.6470	0.72707	1.29285
20	9.77574	0.5431	1.21098	1.01078	h 5	9.86091	0.6477	0.70181	1.29493
h 21	+9.77818	+0.5439	−1.20662	−1.02331	(17.0) 6	+9.86178	+0.6500	−0.67485	−1.29689
(14.0) 22	9.78040	0.5431	1.20209	1.03536	7	9.86279	0.6534	0.64600	1.29871
23	9.78215	0.5416	1.19738	1.04696	8	9.86408	0.6576	0.61498	1.30040
24	9.78340	0.5402	1.19250	1.05812	9	9.86571	0.6620	0.58144	1.30197
25	9.78416	0.5401	1.18744	1.06889	10	9.86766	0.6663	0.54497	1.30341
26	+9.78468	+0.5422	−1.18220	−1.07927	11	+9.86993	+0.6698	−0.50504	−1.30472
27	9.78520	0.5468	1.17678	1.08927	12	9.87244	0.6725	0.46094	1.30591
28	9.78610	0.5536	1.17115	1.09893	13	9.87510	0.6740	0.41173	1.30698
29	9.78762	0.5616	1.16532	1.10824	14	9.87776	0.6743	0.35608	1.30792
30	9.78986	0.5698	1.15930	1.11724	15	9.88032	0.6733	0.29213	1.30874
May 1	+9.79275	+0.5767	−1.15306	−1.12592	16	+9.88256	+0.6714	−0.21695	−1.30944
2	9.79602	0.5815	1.14662	1.13431	17	9.88443	0.6690	0.12585	1.31002
3	9.79933	0.5838	1.13995	1.14241	18	9.88586	0.6669	0.01031	1.31047
4	9.80231	0.5839	1.13306	1.15024	19	9.88692	0.6658	9.85219	1.31081
5	9.80472	0.5826	1.12593	1.15781	20	9.88780	0.6664	9.60090	1.31102
h 6	+9.80648	+0.5810	−1.11856	−1.16511	h 21	+9.88881	+0.6688	−8.93560	−1.31111
(15.0) 7	9.80761	0.5801	1.11094	1.17217	(18.0) 22	9.89012	0.6726	+9.35510	1.31109
8	9.80834	0.5807	1.10307	1.17899	23	9.89198	0.6772	9.73174	1.31094
9	9.80888	0.5831	1.09493	1.18559	24	9.89441	0.6815	9.93029	1.31067
10	9.80948	0.5872	1.08651	1.19196	25	9.89728	0.6845	0.06595	1.31028
11	+9.81030	+0.5925	−1.07780	−1.19811	26	+9.90040	+0.6858	+0.16905	−1.30977
12	9.81148	0.5987	1.06880	1.20405	27	9.90344	0.6851	0.25223	1.30914
13	9.81308	0.6049	1.05948	1.20978	28	9.90616	0.6827	0.32188	1.30839
14	9.81504	0.6108	1.04984	1.21532	29	9.90841	0.6795	0.38180	1.30752
15	9.81736	0.6158	1.03985	1.22067	30	9.91011	0.6761	0.43431	1.30652
16	+9.81993	+0.6197	−1.02951	−1.22582	July 1	+9.91133	+0.6735	+0.48105	−1.30540
17	+9.82266	+0.6223	−1.01880	−1.23080	2	+9.91226	+0.6723	+0.52315	−1.30416

$E = +0''.04 = +0^s.002$

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log *A*.	Log *B*.	Log *C*.	Log *D*.	Solar Day. (Sid. Hr.)	Log *A*.	Log *B*.	Log *C*.	Log *D*.
July 1	+9.91133	+0.6735	+0.48105	−1.30540	Aug. 16	+9.97346	+0.6477	+1.17745	−1.08805
2	9.91226	0.6723	0.52315	1.30416	17	9.97459	0.6508	1.18280	1.07811
3	9.91306	0.6724	0.56139	1.30279	18	9.97616	0.6535	1.18797	1.06782
4	9.91394	0.6740	0.59644	1.30130	19	9.97805	0.6547	1.19295	1.05714
5	9.91500	0.6764	0.62874	1.29968	20	9.98006	0.6539	1.19776	1.04606
h 6	+9.91635	+0.6791	+0.65870	−1.29794	h 21	+9.98195	+0.6512	+1.20240	−1.03456
(19.0) 7	9.91801	0.6818	0.68660	1.29607	(22.0) 22	9.98353	0.6470	1.20687	1.02261
8	9.91991	0.6841	0.71271	1.29407	23	9.98468	0.6421	1.21118	1.01019
9	9.92204	0.6855	0.73723	1.29194	24	9.98538	0.6375	1.21532	0.99728
10	9.92432	0.6859	0.76031	1.28968	25	9.98575	0.6340	1.21930	0.98384
11	+9.92664	+0.6851	+0.78212	−1.28728	26	+9.98594	+0.6323	+1.22313	−0.96983
12	9.92890	0.6831	0.80278	1.28475	27	9.98607	0.6322	1.22680	0.95522
13	9.93092	0.6801	0.82238	1.28209	28	9.98630	0.6335	1.23032	0.93998
14	9.93261	0.6765	0.84102	1.27928	29	9.98675	0.6357	1.23369	0.92404
15	9.93390	0.6729	0.85879	1.27634	30	9.98745	0.6382	1.23691	0.90736
16	+9.93486	+0.6701	+0.87573	−1.27326	31	+9.98837	+0.6405	+1.23999	−0.88987
17	9.93556	0.6687	0.89193	1.27003	Sept. 1	9.98949	0.6422	1.24292	0.87151
18	9.93623	0.6691	0.90744	1.26666	2	9.99076	0.6431	1.24572	0.85221
19	9.93712	0.6711	0.92230	1.26313	3	9.99212	0.6428	1.24837	0.83187
20	9.93840	0.6742	0.93655	1.25946	4	9.99348	0.6413	1.25088	0.81040
h 21	+9.94017	+0.6774	+0.95024	−1.25563	h 5	+9.99476	+0.6388	+1.25326	−0.78767
(20.0) 22	9.94239	0.6797	0.96339	1.25165	(23.0) 6	9.99584	0.6353	1.25550	0.76353
23	9.94490	0.6805	0.97605	1.24750	7	9.99664	0.6315	1.25761	0.73783
24	9.94746	0.6792	0.98823	1.24320	8	9.99712	0.6280	1.25958	0.71037
25	9.94980	0.6761	0.99996	1.23872	9	9.99734	0.6258	1.26142	0.68090
26	+9.95175	+0.6718	+1.01127	−1.23408	10	+9.99742	+0.6254	+1.26313	−0.64914
27	9.95321	0.6672	1.02218	1.22926	11	9.99755	0.6270	1.26471	0.61472
28	9.95421	0.6631	1.03270	1.22428	12	9.99789	0.6303	1.26616	0.57717
29	9.95489	0.6602	1.04286	1.21910	13	9.99861	0.6346	1.26748	0.53590
30	9.95541	0.6589	1.05267	1.21374	14	9.99974	0.6387	1.26867	0.49013
31	+9.95592	+0.6590	+1.06214	−1.20818	15	+0.00122	+0.6417	+1.26974	−0.43878
Aug. 1	9.95656	0.6604	1.07130	1.20244	16	0.00290	0.6429	1.27067	0.38035
2	9.95744	0.6622	1.08015	1.19649	17	0.00452	0.6420	1.27148	0.31264
3	9.95860	0.6641	1.08871	1.19033	18	0.00592	0.6394	1.27217	0.23217
4	9.95999	0.6658	1.09698	1.18396	19	0.00695	0.6359	1.27272	0.13309
h 5	+9.96157	+0.6667	+1.10498	−1.17738	h 20	+0.00755	+0.6324	+1.27315	−0.00422
(21.0) 6	9.96332	0.6667	1.11272	1.17056	(0.0) 21	0.00781	0.6298	1.27346	9.81990
7	9.96513	0.6655	1.12021	1.16352	22	0.00782	0.6289	1.27363	−9.49250
8	9.96690	0.6631	1.12745	1.15623	23	0.00777	0.6297	1.27368	+8.59219
9	9.96853	0.6596	1.13446	1.14869	24	0.00780	0.6322	1.27360	9.59017
10	+9.96990	+0.6554	+1.14124	−1.14089	25	+0.00802	+0.6357	+1.27340	+9.86893
11	9.97091	0.6509	1.14779	1.13283	26	0.00848	0.6397	1.27306	0.03729
12	9.97160	0.6471	1.15413	1.12448	27	0.00918	0.6437	1.27260	0.15827
13	9.97201	0.6445	1.16026	1.11584	28	0.01009	0.6471	1.27202	0.25274
14	9.97232	0.6439	1.16619	1.10690	29	0.01117	0.6498	1.27130	0.33021
15	+9.97274	+0.6451	+1.17192	−1.09764	30	+0.01236	+0.6514	+1.27045	+0.39586
16	+9.97346	+0.6477	+1.17745	−1.08805	Oct. 1	+0.01357	+0.6519	+1.26947	+0.45278

$E = +0''.04 = +0^s.003$

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sid. Hr.)	Log *A*.	Log *B*.	Log *C*.	Log *D*.	Solar Day. (Sid. Hr.)	Log *A*.	Log *B*.	Log *C*.	Log *D*.
Oct. 1	+0.01357	+0.6519	+1.26947	+0.45278	Nov. 16	+0.05476	+0.7303	+1.04490	+1.21801
2	0.01472	0.6513	1.26836	0.50301	17	0.05516	0.7330	1.03425	1.22350
3	0.01575	0.6499	1.26712	0.54794	18	0.05569	0.7368	1.02320	1.22880
4	0.01654	0.6479	1.26575	0.58854	19	0.05641	0.7411	1.01171	1.23390
5	0.01704	0.6461	1.26424	0.62558	20	0.05739	0.7456	0.99977	1.23880
h (1.0) 6	+0.01731	+0.6452	+1.26260	+0.65961	h (4.0) 21	+0.05859	+0.7498	+0.98733	+1.24353
7	0.01743	0.6458	1.26082	0.69105	22	0.05995	0.7534	0.97439	1.24807
8	0.01755	0.6483	1.25890	0.72027	23	0.06145	0.7561	0.96091	1.25243
9	0.01783	0.6526	1.25684	0.74754	24	0.06302	0.7580	0.94685	1.25661
10	0.01844	0.6581	1.25464	0.77309	25	0.06458	0.7589	0.93218	1.26062
11	+0.01946	+0.6637	+1.25230	+0.79711	26	+0.06606	+0.7589	+0.91684	+1.26446
12	0.02087	0.6686	1.24982	0.81976	27	0.06738	0.7584	0.90080	1.26814
13	0.02252	0.6719	1.24719	0.84119	28	0.06848	0.7575	0.88400	1.27165
14	0.02421	0.6732	1.24441	0.86149	29	0.06935	0.7569	0.86637	1.27500
15	0.02575	0.6729	1.24148	0.88078	30	0.07001	0.7570	0.84786	1.27818
16	+0.02694	+0.6713	+1.23840	+0.89913	Dec. 1	+0.07061	+0.7583	+0.82838	+1.28122
17	0.02775	0.6695	1.23516	0.91662	2	0.07125	0.7610	0.80783	1.28409
18	0.02820	0.6683	1.23176	0.93332	3	0.07209	0.7648	0.78611	1.28681
19	0.02839	0.6684	1.22821	0.94929	4	0.07327	0.7692	0.76310	1.28938
20	0.02846	0.6701	1.22448	0.96457	5	0.07484	0.7735	0.73865	1.29180
h (2.0) 21	+0.02859	+0.6734	+1.22060	+0.97922	h (5.0) 6	+0.07674	+0.7769	+0.71259	+1.29408
22	0.02888	0.6778	1.21654	0.99326	7	0.07882	0.7789	0.68472	1.29620
23	0.02939	0.6827	1.21231	1.00675	8	0.08088	0.7793	0.65477	1.29818
24	0.03018	0.6877	1.20791	1.01971	9	0.08274	0.7783	0.62244	1.30002
25	0.03118	0.6922	1.20332	1.03218	10	0.08428	0.7766	0.58737	1.30171
26	+0.03235	+0.6961	+1.19855	+1.04417	11	+0.08545	+0.7748	+0.54905	+1.30326
27	0.03364	0.6990	1.19359	1.05572	12	0.08631	0.7736	0.50685	1.30467
28	0.03498	0.7010	1.18843	1.06685	13	0.08697	0.7735	0.45993	1.30594
29	0.03631	0.7019	1.18308	1.07758	14	0.08755	0.7745	0.40717	1.30706
30	0.03755	0.7019	1.17753	1.08792	15	0.08821	0.7767	0.34691	1.30805
31	+0.03858	+0.7013	+1.17176	+1.09790	16	+0.08901	+0.7795	+0.27675	+1.30890
Nov. 1	0.03936	0.7007	1.16578	1.10753	17	0.09004	0.7826	0.19282	1.30962
2	0.03991	0.7006	1.15959	1.11682	18	0.09127	0.7855	0.08851	1.31019
3	0.04028	0.7016	1.15317	1.12579	19	0.09267	0.7879	9.95072	1.31063
4	0.04062	0.7042	1.14650	1.13445	20	0.09419	0.7895	9.74750	1.31093
h 5	+0.04109	+0.7082	+1.13960	+1.14282	h (6.0) 21	+0.09579	+0.7904	+9.35265	+1.31109
(3.0) 6	0.04184	0.7135	1.13244	1.15091	22	0.09738	0.7903	−9.03662	1.31111
7	0.04298	0.7192	1.12503	1.15872	23	0.09892	0.7895	9.64621	1.31100
8	0.04450	0.7245	1.11736	1.16626	24	0.10032	0.7879	9.89023	1.31075
9	0.04632	0.7285	1.10940	1.17355	25	0.10151	0.7860	0.04543	1.31036
10	+0.04825	+0.7309	+1.10116	+1.18059	26	+0.10248	+0.7840	−0.15946	+1.30983
11	0.05011	0.7316	1.09261	1.18739	27	0.10324	0.7826	0.24955	1.30917
12	0.05171	0.7311	1.08375	1.19395	28	0.10385	0.7822	0.32401	1.30836
13	0.05294	0.7299	1.07456	1.20029	29	0.10448	0.7829	0.38746	1.30742
14	0.05377	0.7290	1.06503	1.20641	30	0.10521	0.7849	0.44268	1.30634
15	+0.05435	+0.7290	+1.05515	+1.21232	31	+0.10622	+0.7877	−0.49153	+1.30511
16	+0.05476	+0.7303	+1.04490	+1.21801	32	+0.10758	+0.7905	−0.53532	+1.30375

E = +0″.03 = +0ˢ.002

FOR MEAN MIDNIGHT.

1

FOR WASHINGTON MEAN MIDNIGHT.

Solar Day. (Sidereal Hour.)		τ	f	f′	G		H		Log g.	Log h.	i	Log i.
			In Time.	In Time.	In Arc.	In Time.	In Arc.	In Time.				
		y	s	s	° ′	h m	° ′	h m			″	
Apr.	1	0.2486	+1.722	−0.011	15 6.6	1 0.4	257 35.0	17 10.3	1.06219	1.27528	−7.99	−0.9023
	2	0.2513	1.727	0.011	15 20.4	1 1.4	256 31.0	17 6.1	1.06415	1.27556	7.96	0.9007
	3	0.2541	1.733	0.008	15 32.1	1 2.1	255 27.1	17 1.8	1.06677	1.27587	7.92	0.8990
	4	0.2568	1.738	−0.002	15 39.1	1 2.6	254 23.4	16 57.5	1.06982	1.27619	7.89	0.8971
	5	0.2596	1.745	+0.004	15 39.8	1 2.7	253 19.8	16 53.3	1.07296	1.27653	7.85	0.8951
h	6	0.2623	+1.750	+0.011	15 34.9	1 2.3	252 16.4	16 49.1	1.07579	1.27689	−7.82	−0.8930
(13.0)	7	0.2650	1.756	0.015	15 26.4	1 1.8	251 13.1	16 44.9	1.07804	1.27727	7.78	0.8908
	8	0.2678	1.761	0.017	15 16.7	1 1.1	250 10.0	16 40.7	1.07957	1.27768	7.73	0.8884
	9	0.2705	1.767	0.016	15 9.0	1 0.6	249 7.0	16 36.5	1.08043	1.27810	7.69	0.8858
	10	0.2732	1.773	0.012	15 4.9	1 0.3	248 4.2	16 32.3	1.08087	1.27853	7.64	0.8832
	11	0.2760	+1.779	+0.007	15 5.7	1 0.4	247 1.5	16 28.1	1.08108	1.27899	−7.59	−0.8804
	12	0.2787	1.785	+0.001	15 11.2	1 0.7	245 59.0	16 23.9	1.08134	1.27946	7.54	0.8774
	13	0.2814	1.792	−0.004	15 20.6	1 1.4	244 56.7	16 19.8	1.08188	1.27996	7.49	0.8743
	14	0.2842	1.798	0.008	15 32.2	1 2.1	243 54.6	16 15.6	1.08279	1.28046	7.43	0.8710
	15	0.2869	1.804	0.011	15 44.9	1 3.0	242 52.7	16 11.5	1.08416	1.28096	7.37	0.8676
	16	0.2897	+1.810	−0.011	15 56.6	1 3.8	241 50.9	16 7.4	1.08594	1.28148	−7.31	−0.8641
	17	0.2924	1.817	0.010	16 6.5	1 4.4	240 49.3	16 3.3	1.08806	1.28201	7.25	0.8603
	18	0.2951	1.823	0.008	16 13.5	1 4.9	239 47.9	15 59.2	1.09045	1.28256	7.19	0.8565
	19	0.2979	1.830	−0.005	16 17.0	1 5.1	238 46.7	15 55.1	1.09299	1.28312	7.12	0.8524
	20	0.3006	1.836	0.000	16 16.7	1 5.1	237 45.7	15 51.0	1.09552	1.28369	7.05	0.8482
h	21	0.3034	+1.843	+0.003	16 13.0	1 4.9	236 44.9	15 47.0	1.09783	1.28428	−6.98	−0.8439
(14.0)	22	0.3061	1.850	0.006	16 6.7	1 4.4	235 44.3	15 43.0	1.09981	1.28487	6.91	0.8394
	23	0.3088	1.856	0.007	15 59.9	1 4.0	234 43.8	15 38.9	1.10132	1.28546	6.83	0.8346
	24	0.3116	1.863	0.005	15 54.4	1 3.6	233 43.6	15 34.9	1.10237	1.28606	6.76	0.8298
	25	0.3143	1.870	+0.001	15 52.5	1 3.5	232 43.5	15 30.9	1.10306	1.28667	6.68	0.8247
	26	0.3170	+1.877	−0.004	15 55.9	1 3.7	231 43.6	15 26.9	1.10370	1.28729	−6.60	−0.8195
	27	0.3198	1.885	0.009	16 4.3	1 4.3	230 44.0	15 22.9	1.10452	1.28792	6.52	0.8140
	28	0.3225	1.892	0.012	16 16.9	1 5.1	229 44.5	15 19.0	1.10589	1.28855	6.43	0.8084
	29	0.3253	1.899	0.013	16 30.9	1 6.1	228 45.3	15 15.0	1.10793	1.28917	6.35	0.8026
	30	0.3280	1.907	0.010	16 43.8	1 6.9	227 46.2	15 11.1	1.11065	1.28981	6.26	0.7966
May	1	0.3307	+1.914	−0.005	16 52.5	1 7.5	226 47.4	15 7.2	1.11388	1.29044	−6.17	−0.7903
	2	0.3335	1.922	+0.002	16 55.8	1 7.7	225 48.7	15 3.3	1.11727	1.29107	6.08	0.7839
	3	0.3362	1.929	0.009	16 53.6	1 7.6	224 50.3	14 59.4	1.12049	1.29171	5.99	0.7772
	4	0.3390	1.937	0.014	16 47.3	1 7.2	223 52.0	14 55.5	1.12323	1.29234	5.89	0.7703
	5	0.3417	1.945	0.017	16 39.3	1 6.6	222 53.9	14 51.6	1.12534	1.29297	5.80	0.7632
h	6	0.3444	+1.953	+0.017	16 32.0	1 6.1	221 56.1	14 47.7	1.12683	1.29359	−5.70	−0.7558
(15.0)	7	0.3472	1.961	0.014	16 27.6	1 5.8	220 58.5	14 43.9	1.12779	1.29422	5.60	0.7482
	8	0.3499	1.969	0.009	16 27.2	1 5.8	220 1.0	14 40.1	1.12851	1.29484	5.50	0.7403
	9	0.3526	1.977	+0.004	16 31.3	1 6.1	219 3.8	14 36.3	1.12920	1.29547	5.40	0.7322
	10	0.3554	1.986	−0.002	16 38.9	1 6.6	218 6.7	14 32.4	1.13009	1.29609	5.29	0.7238
	11	0.3581	+1.994	−0.006	16 48.7	1 7.2	217 9.8	14 28.6	1.13128	1.29670	−5.19	−0.7151
	12	0.3608	2.002	0.009	16 59.8	1 8.0	216 13.1	14 24.9	1.13288	1.29730	5.08	0.7061
	13	0.3636	2.011	0.011	17 10.0	1 8.7	215 16.7	14 21.1	1.13488	1.29790	4.97	0.6967
	14	0.3663	2.020	0.010	17 18.7	1 9.2	214 20.3	14 17.4	1.13718	1.29849	4.86	0.6871
	15	0.3691	2.028	0.008	17 24.8	1 9.7	213 24.2	14 13.6	1.13974	1.29908	4.75	0.6771
	16	0.3718	+2.037	−0.005	17 27.9	1 9.9	212 28.2	14 9.9	1.14244	1.29965	−4.64	−0.6668
	17	*0.3745*	*+2.046*	*−0.001*	17 27.5	1 9.8	211 32.4	14 6.2	1.14515	1.30022	−4.53	−0.6561

5934°—1919——14

FOR MEAN MIDNIGHT.

FOR MEAN MIDNIGHT.

FOR MEAN MIDNIGHT.

FOR MEAN MIDNIGHT.

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FOR WASHINGTON SIDEREAL TWELVE HOURS.

Mean Solar Date.	Log A_1.	Log B_1.	Log C.	Log D.	f	G_1	H	Log g_1.	Log h.	Log i.
					s	° ′	° ′			
Jan. 0.72	+9.5263	+0.5259	−0.5124	+1.3045	+1.035	26 30	350 50	0.8765	1.3101	−0.1497
10.70	9.5690	0.5238	0.8107	1.2838	1.142	24 12	341 24	0.9109	1.3070	0.4480
20.67	9.6056	0.5146	0.9765	1.2473	1.242	22 2	331 49	0.9405	1.3022	0.6138
30.64	9.6365	0.5005	1.0856	1.1926	1.333	20 2	321 59	0.9656	1.2961	0.7229
Feb. 9.61	9.6624	0.4842	1.1614	1.1142	1.415	18 19	311 54	0.9870	1.2896	0.7986
19.59	+9.6840	+0.4692	−1.2138	+1.0020	+1.487	16 55	301 33	1.0052	1.2833	−0.8511
Mar. 1.56	9.7022	0.4591	1.2484	0.8316	1.550	15 55	290 57	1.0212	1.2781	0.8857
11.53	9.7180	0.4567	1.2678	+0.5233	1.608	15 17	280 13	1.0356	1.2748	0.9051
21.50	9.7324	0.4640	1.2736	−9.2851	1.662	15 3	269 25	1.0496	1.2737	0.9109
31.48	9.7463	0.4806	1.2664	0.5679	1.716	15 8	258 41	1.0636	1.2750	0.9037
Apr. 10.45	+9.7606	+0.5048	−1.2460	−0.8497	+1.773	15 28	248 8	1.0786	1.2785	−0.8833
20.42	9.7757	0.5339	1.2113	1.0098	1.836	15 57	237 50	1.0947	1.2836	0.8486
30.39	9.7920	0.5648	1.1599	1.1163	1.906	16 28	227 52	1.1122	1.2897	0.7972
May 10.37	9.8096	0.5948	1.0876	1.1911	1.985	16 55	218 14	1.1308	1.2960	0.7249
20.34	9.8283	0.6218	0.9861	1.2440	2.071	17 14	208 55	1.1502	1.3018	0.6234
30.31	+9.8476	+0.6443	−0.8371	−1.2799	+2.166	17 21	199 51	1.1698	1.3065	−0.4744
June 9.29	9.8672	0.6615	0.5889	1.3016	2.265	17 15	190 58	1.1892	1.3097	0.2262
19.26	9.8865	0.6730	−9.8960	1.3107	2.368	16 58	182 12	1.2078	1.3111	−9.5333
29.23	9.9051	0.6789	+0.3665	1.3078	2.472	16 30	173 28	1.2254	1.3106	+0.0038
July 9.20	9.9226	0.6794	0.7301	1.2926	2.573	15 54	164 41	1.2415	1.3083	0.3674
19.18	+9.9386	+0.6754	+0.9176	−1.2643	+2.670	15 13	155 46	1.2561	1.3043	+0.5549
29.15	9.9531	0.6678	1.0394	1.2209	2.761	14 30	146 39	1.2692	1.2991	0.6767
Aug. 8.12	9.9659	0.6581	1.1247	1.1590	2.843	13 48	137 16	1.2806	1.2931	0.7620
18.09	9.9770	0.6479	1.1859	1.0721	2.917	13 10	127 35	1.2906	1.2869	0.8232
28.07	9.9867	0.6393	1.2288	0.9467	2.982	12 38	117 34	1.2993	1.2812	0.8661
Sept. 7.04	+9.9952	+0.6342	+1.2566	−0.7500	+3.042	12 16	107 17	1.3072	1.2767	+0.8939
17.01	0.0029	0.6344	1.2711	−0.3470	3.096	12 3	96 47	1.3146	1.2742	0.9084
26.99	0.0102	0.6406	1.2729	+0.1002	3.148	12 2	86 9	1.3218	1.2738	0.9102
Oct. 6.96	0.0175	0.6529	1.2618	0.6743	3.201	12 10	75 30	1.3294	1.2759	0.8991
16.93	0.0251	0.6704	1.2370	0.9068	3.258	12 26	64 57	1.3374	1.2799	0.8743
26.90	+0.0336	+0.6914	+1.1966	+1.0489	+3.322	12 47	54 34	1.3465	1.2856	+0.8339
Nov. 5.88	0.0430	0.7138	1.1370	1.1459	3.394	13 10	44 25	1.3566	1.2920	0.7743
15.85	0.0533	0.7355	1.0517	1.2143	3.476	13 30	34 31	1.3675	1.2984	0.6890
25.82	0.0646	0.7549	0.9273	1.2619	3.568	13 44	24 50	1.3792	1.3040	0.5646
Dec. 5.79	0.0766	0.7704	0.7311	1.2925	3.667	13 51	15 21	1.3914	1.3083	0.3684
15.77	+0.0888	+0.7813	+0.3294	+1.3083	+3.772	13 48	6 0	1.4035	1.3107	+9.9667
25.74	0.1010	0.7871	−0.0755	1.3103	3.880	13 37	356 40	1.4154	1.3110	−9.7128
35.71	+0.1128	+0.7879	−0.6511	+1.2984	+3.986	13 17	347 18	1.4266	1.3092	−0.2884

$E = +0^s.003$

The above numbers give the same reductions from mean to apparent place as are employed in computing the apparent places of the fixed stars, given on pages 316 to 513, from the mean places, given on pages 217 to 230. In order to render exact interpolation possible through intervals *of ten days, all short period terms* have been omitted.

FOR W MEAN MIDNIGHT.

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0.06

FOR W MEAN MIDNIGHT.

FOR JANUARY $0^d.701$, WASHINGTON MEAN TIME.

35 Ceti, dup., $5^m.5$, $6^m.2$, $0''.2$
α Cassiop., var. irreg., $2^m.2$, $2^m.8$
η Cassiop., comp. $7^m.6$, $4''$ s. pr.

β Phoenicis, dup., $4^m.1$, $4^m.1$, $1''$
ζ Piscium, star $6^m.5$, $24''$ n. f.

κ Tucanae, comp. 7^m, $5''$ n.
ϵ Sculptoris, comp. 9^m, $5''$ n. f.

FOR JANUARY $0^d.701$, MEAN TIME.

o Ceti, var., 331^d, $1^m.7$–$9^m.6$, star $9^m.1$ [illegible]
ι Cassiop., triple, 7^m, 8^m, 2″, 8″
γ Ceti, comp. $6^m.2$, 2″.7 pr.

η Persei, star $8^m.5$, 28″ n. pr.
ϵ Arietis, dup., $5^m.2$, $5^m.6$, 1″.2
θ Eridani, comp. $4^m.4$, f. 8″.

ρ Persei, var. irreg., $3^m.4$–$4^m.2$
β Persei, var., $2^d.87$, $2^m.1$–$3^m.2$
12 Eridani, comp. 7^m, 1″.4 n. pr.

FOR JANUARY 0d.701, MEAN TIME.

R Horologii, remarkable purplish red star.
ε Eridani, comp. 9m, s. 7′

φ Tauri, quad., comps. 6m.3, 7m.6, 8m.2, 117″, 181″, 190″
9 H. Camelop., comp. 8m, 1″.9 n. f.
ε Persei, comp. 8m, 8″.8 n. f.

λ Tauri, var., 3d 95, 3m.3–4m.2
A Tauri, star 6m.5 f. 38s, 253″ s.
m Persei, star 7m, 115″ s. pr.
ε Aurigæ, var. irreg., 3m.3–4m.5

FOR JANUARY $0^d.701$, MEAN TIME.

β Orionis, comp. $8^m.0$, $9''.5$ s. pr.
δ Orionis, star $6^m.9$, $52''.6$ n.
ι Orionis, comp. $7^m.3$, $11''.5$ s. f.

ζ Orionis, comp. $4^m.2$, $2''.4$ s. f.
α Orionis, red star, var. irreg., $1^m.0$–$1^m.4$
θ Aurigæ, comp. $7^m.5$, $2''.5$ n. pr.

1 Puppis, star $5^m.8$, f. 12^s, $180''$ s.
η Gem., var., $231^d.4$, $3^m.2$–$4^m.2$, comp. $8^m.8$, $1''.3$ n. pr.
8 Monoc., star $6^m.5$, $13''.7$ n. f.

FOR JANUARY $0^d.701$, MEAN TIME.

γ^2 Volantis, comp. $5^m.8$, 12″.9 n. pr.
δ Gem., comp. 8^m, 7″.0 s. pr.
σ Argus, star 8^m, 22″.4 n. f.
κ Gem., comp. $8^m.5$, 6″.6 s. pr.

with

…yon are those of the centers of their orbits. Corrections given on page x remain … of the stars.

FOR JANUARY $0^d.701$, WASHINGTON MEAN TIME.

ι Cancri, star $6^m.6$, $30''.6$ n. pr.
θ Argus, comp. 5^m, $2'$ s.
ϵ *Hydræ, triple; binary $3^m.5$, $6^m.8$, $0''.2$, with comp. $7^m.8$, $3''.3$*

ϵ^2 Cancri, dup., $5^m.9$, $6^m.4$, $1''.4$
δ^1 Carinæ, comp. $7^m.2$, 5^s f.
σ^2 Urs. Maj., binary, $4^m.9$, 8^m, $1''.3$

ψ Argus, dup., $3^m.8$, $6^m.0$, $0''.2$
v Argus, comp. $6^m.0$, $4''.9$ s. f.
γ Leonis, comp. $3^m.8$, $3''.7$ s. f.

FOR JANUARY $0^{d}.701$, WASHINGTON MEAN TIME.

η Argus, var. irreg., $1^{m}.0$–$6^{m}.0$
ρ Argus, comp. 7^{m}, $2''.2$ n. f.

β Cham., star $8^{m}.5$ pr. 32^{s}, $256''$ n.
54 Leonis, comp. $6^{m}.3$, $6''.4$ s. f.

ι Leonis, comp. $6^{m}.8$, $2''.6$ n. f.
2 Can. Ven., star 9^{m}, $11''.5$ s. pr.

FOR JANUARY $0^d.701$, WASHINGTON MEAN TIME.

δ Corvi, star 8^m, 24″.4 s. pr.
γ Crucis, star $5^m.6$, 85″ n. f.
24 *Comæ, star $6^m.7$, 20″ 6 pr.*
γ *Cent., dup., $3^m.1$, $3^m.1$, 1″.7*

γ Virginis, binary, $3^m.7$, $3^m.7$, 6″.4, P=324°
α Can. Ven., star 5^m, 19″.8 s. pr.
θ Virginis, comp. 9^m, 7″.1 n. pr.

ζ[1] Urs. Maj., star Alcor $4^m.0$, f. $7^s.0$, 222″ n.
θ Apodis, var. irreg., $5^m.5$-$6^m.6$

FOR JANUARY $0^d.701$, MEAN TIME.

is, comp. 9^m, $4''.5$ s. f. | δ Libræ, var., $2^d.33$, $4^m.8$-$6^m.2$ | γ Lupi, binary, $3^m.1$, $3^m.9$, $0''.4$

, comp. $5^m.1$, $2''.8$ n. pr. | μ Boötis, star $6^m.7$, $108''$ s. | ζ Cor. Bor., comp. $6^m.0$, $6''.2$ n. pr.

tauri, dup., $0^m.3$, $1^m.7$; *companion s. pr.* The position given is that of the center of gravity of the system. us given on *page x remain to be applied to* reduce to the position of α^2 Centauri.

FOR JANUARY $0^d.701$, MEAN TIME.

β Scorpii, comp. $5^m.1$, 13″.3 n. f.
κ Herculis, star $6^m.5$, 29″.7 n. f.
σ *Cor. Bor.*, comp. $6^m.7$, 4″.6 s. pr.
σ *Scorpii, star* 8^m, *21″ pr.*
ψ *Draconis, comp.* 8^m, *3″.4 s. f.*

α Scorpii, comp. 7^m, 3″.2 pr.
λ Ophiuchi, comp. 6^m, 1″.2 n. f.
ζ Herculis, binary, $3^m.0$, $6^m.0$, 1″
η Oph., binary, $3^m.2$, $3^m.7$, 0″.5

α Herculis, var. irreg., 3^m dup., comp. 6^m, 4″.6 s. f.
δ Herculis, binary, comp. 8 s. pr.

FOR JANUARY $0^d.701$, MEAN TIME.

ψ Draconis, star $6^m.1$, 30″.4 n. f.
70 Ophiuchi, comp. 6^m, 3″.3 s. f.

β Lyræ, var., $12^d.9$, $3^m.4$–$4^m.1$, star 7^m, 46″ s. f.
ε Draco., star $7^m.6$, 32″.1 n. pr.

θ Serpentis, star $5^m.4$, 22″.2 s. f.
R Lyræ, var., $46^d.4$, $4^m.0$–$4^m.7$
ζ Sag., binary, $3^m.4$, $3^m.5$, 0″.5

FOR JANUARY $0^d.701$, MEAN TIME.

β Cygni, star $5^m.4$, 34″.7 n. f.
δ Cygni, comp. 8^m, 1″.6 n. pr.
η Aquilæ, var., $7^d.18$, $3^m.7$–$4^m.4$
ε Draconis, comp. $7^m.6$, 3″.1 n.

ο Cygni, star $5^m.0$ pr. 19^s, 270″ n., star $7^m.8$ f. 1^s, 98″ s.
κ Cephei, comp. 8^m, 7″.5 s. f.
α^2 Capricor., α^1 Capricor. $4^m.6$ pr. 24^s, 137″ n.

β Capricor., star $6^m.2$ pr. 1^s, 10″ s.
π Capricor., comp. 9^m, 3″.4 s. f.
ρ Capricor., comp. $7^m.6$, 2″.8 s.
β Delphini, binary, $4^m.1$, $5^m.4$, 0″.8
γ Delphini, comp. $5^m.5$, 11″.2 pr.

FOR JANUARY $0^d.701$, MEAN TIME.

τ Cygni, comp. 7^m, $0''.8$ | ψ Cygni, star $6^m.7$ f. 10^s, $420''$ s. | β Cephei, star 8^m, $13''.3$ s. pr.

FOR JANUARY $0^d.701$, MEAN TIME.

β Pegasi, var. irreg., $2^m.2$–$2^m.7$
π Cephei, comp. 7^m, $0''.9$ f.

ψ Aquarii, star $8^m.5$, $49''.4$ n. pr.
o Cephei, comp. 8^m, $2''.9$ s. pr.

72 Pegasi, binary, $6^m.0$, $6^m.0$, $0''.4$

FOR JANUARY 0^{d}.701, WASHINGTON MEAN TIME.

Name of Star.	Magnitude.	Spectrum.	Right Ascension.	Annual Variation.	Annual P. M.	Declination.	Annual Variation.	Annual P. M.
			h m s	s	s	° ′ ″	″	″
43 H. Cephei . . .	4.5	K0	0 57 24.633	+ 7.6822	+.0732	+85 49 24.14	+19.415	−0.004
α Ursæ Min. (*Polaris*) . †	2.1	F8	1 31 11.709	+29.5294	+.1486	+88 52 20.55	+18.481	+0.002
4 G. Octantis . .	5.6	K0	1 41 54.846	− 3.7349	+.0086	−85 10 45.22	+18.124	+0.028
Groombridge 750 .	6.7	F8	4 10 37.831	+17.6528	+.0129	+85 20 28.88	+ 9.249	+0.042
Groombridge 944 .	6.4	K0	5 35 50.330	+18.7787	+.0130	+85 9 34.51	+ 2.105	−0.004
31 G. Mensæ . . .	6.2	A0	5 45 51.396	−11.6781	−.0122	−84 49 44.27	+ 1.323	+0.067
ζ Mensæ . . .	5.6	A2	6 46 48.653	− 4.9478	−.0036	−80 43 46.14	− 3.984	+0.082
51 H. Cephei . . .	5.3	Ma	7 3 2.335	+29.1137	−.0579	+87 10 43.86	− 5.479	−0.035
25 H. Camelopardalis .	5.1	Mb	7 14 7.912	+12.8037	+.0132	+82 34 17.32	− 6.418	−0.047
7 G. Octantis . .	6.4	F5	7 15 39.691	−20.3258	−.0146	−86 54 19.75	− 6.493	+0.005
Groombridge 1119 .	7.0	A0	8 17 47.546	+59.2588	−.0397	+88 52 37.80	−11.321	+0.017
ζ Octantis . . .	5.4	A3	9 8 41.594	− 8.1888	−.1147	−85 20 26.78	−14.658	+0.043
1 H. Draconis . .	4.6	K0	9 25 39.275	+ 8.7704	−.0059	+81 41 10.13	−15.696	−0.027
ζ Chamæleontis . .	5.2	B3	9 36 19.026	− 1.6637	−.0121	−80 34 39.26	−16.214	+0.019
30 H. Camelopardalis .	5.3	F5	10 21 19.949	+ 7.5502	−.0462	+82 58 17.67	−18.207	+0.009
η Octantis . . .	6.3	A0	10 59 54.546	− 0.3703	−.0575	−84 9 29.33	−19.365	−0.005
Bradley 1672 . .	6.3	F0	12 14 29.190	+ 0.3895	−.0713	+88 8 56.19	−19.947	+0.058
ι Octantis . . .	5.4	K0	12 46 19.119	+ 5.9921	+.0366	−84 41 1.57	−19.613	+0.024
32 H. Camelop. *seq.* . †	5.3	A2	12 48 31.308	+ 0.4468	−.0184	+83 51 11.30	−19.582	+0.016
κ Octantis . . .	5.6	A2	13 27 32.891	+ 9.1502	−.0765	−85 22 19.48	−18.624	−0.024
δ Octantis . . .	4.1	K2	14 13 46.350	+ 9.2894	−.0512	−83 17 54.52	−16.741	−0.014
Groombridge 2283 .	7.2	K0	15 3 2.510	−19.2662	−.0068	+87 32 42.66	−13.954	+0.031
ρ Octantis . . .	5.7	A2	15 24 23.351	+13.3929	+.0842	−84 11 55.43	−12.508	+0.080
ε Ursæ Minoris . .	4.4	G5	16 54 12.991	− 6.2449	+.0057	+82 10 21.42	− 5.675	−0.001
59 G. Apodis . . .	5.9	Mb	17 16 17.234	+11.1713	+.0086	−80 47 14.27	− 3.839	−0.039
δ Ursæ Minoris . .	4.4	A0	17 58 22.311	−19.4972	+.0173	+86 36 51.04	− 0.095	+0.048
χ Octantis . . .	5.2	K0	18 7 23.343	+35.7206	−.0957	−87 39 50.89	+ 0.519	−0.127
λ Ursæ Minoris . .	6.6	Mb	19 0 15.079	−72.4933	−.1109	+89 1 12.80	+ 5.215	+0.006
σ Octantis . . .	5.5	F0	19 30 50.769	+93.7699	+.1079	−89 13 13.35	+ 7.739	−0.001
76 Draconis . . .	5.7	A0	20 48 32.146	− 4.1793	+.0131	+82 13 56.82	+13.473	+0.025
λ Octantis . . . †	5.4	G0p	21 38 38.548	+ 9.4923	+.0389	−83 5 34.33	+16.339	−0.012
ν Octantis . . .	5.7	K0	22 16 33.212	+12.2485	−.0400	−86 22 50.92	+18.112	+0.074
β Octantis . . .	4.3	F0	22 37 51.624	+ 6.2982	−.0302	−81 48 24.80	+18.773	+0.002
39 H. Cephei . . .	5.6	F0	23 27 43.571	− 0.2831	+.0641	+86 51 38.62	+19.867	+0.020
γ^1 Octantis . . .	5.1	G5	23 47 23.637	+ 3.6038	−.0247	−82 28 8.42	+20.003	−0.012

α Ursæ Min., star 9^m, 18″ s. pr. | 32 H. Camelop., star 5^m.8, 21″.6 n. pr. | λ Octantis, binary, 5^m.5, 8^m.0, 3″.2 nf.

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Jan.	0 57	+85 49	Jan.	1 31	+88 52	Jan.	1 41	−85 10	Jan.	4 10	+85 20	Jan.	5 36	+85 9
	s	″		s	″		s	″		s	″		s	″
0.3	32.06	49.91	0.3	49.26	45.14	0.3	55.81	60.28	0.4	58.57	40.77	0.5	12.48	36.92
1.3	31.79	50.03	1.3	48.29	45.30	1.3	55.53	60.28	1.4	58.48	41.08	1.5	12.50	37.24
2.3	31.50	50.14	2.3	47.24	45.46	2.3	55.28	60.27	2.4	58.38	41.40	2.5	12.51	37.57
3.3	31.19	50.24	3.3	46.14	45.61	3.3	55.03	60.26	3.4	58.26	41.72	3.4	12.50	37.92
4.3	30.87	50.31	4.3	44.99	45.76	4.3	54.78	60.26	4.4	58.13	42.04	4.4	12.46	38.27
5.3	30.56	50.36	5.3	43.83	45.87	5.3	54.54	60.26	5.4	57.98	42.32	5.4	12.42	38.61
6.2	30.24	50.39	6.3	42.67	45.95	6.3	54.27	60.27	6.4	57.82	42.59	6.4	12.36	38.94
7.2	29.95	50.39	7.3	41.55	46.01	7.3	54.01	60.28	7.4	57.65	42.83	7.4	12.28	39.24
8.2	29.65	50.39	8.3	40.50	46.05	8.3	53.74	60.31	8.4	57.49	43.07	8.4	12.20	39.53
9.2	29.40	50.39	9.3	39.51	46.10	9.3	53.45	60.34	9.4	57.34	43.27	9.4	12.14	39.79
10.2	29.15	50.39	10.3	38.57	46.15	10.3	53.13	60.34	10.4	57.20	43.48	10.4	12.07	40.05
11.2	28.91	50.40	11.3	37.68	46.21	11.3	52.82	60.31	11.4	57.07	43.69	11.4	12.03	40.31
12.2	28.67	50.44	12.3	36.76	46.30	12.3	52.53	60.26	12.4	56.97	43.92	12.4	12.00	40.57
13.2	28.40	50.48	13.3	35.80	46.39	13.3	52.23	60.18	13.4	56.84	44.17	13.4	11.97	40.85
14.2	28.13	50.52	14.2	34.76	46.49	14.3	51.94	60.09	14.4	56.71	44.43	14.4	11.93	41.17
15.2	27.84	50.54	15.2	33.66	46.57	15.3	51.68	60.00	15.4	56.57	44.68	15.4	11.88	41.49
16.2	27.52	50.55	16.2	32.50	46.63	16.3	51.43	59.89	16.4	56.40	44.95	16.4	11.79	41.81
17.2	27.21	50.55	17.2	31.28	46.68	17.2	51.19	59.80	17.4	56.20	45.20	17.4	11.70	42.13
18.2	26.88	50.50	18.2	30.07	46.71	18.2	50.94	59.75	18.3	55.99	45.43	18.4	11.58	42.43
19.2	26.57	50.44	19.2	28.89	46.71	19.2	50.69	59.68	19.3	55.78	45.64	19.4	11.45	42.72
20.2	26.28	50.35	20.2	27.74	46.67	20.2	50.42	59.61	20.3	55.56	45.84	20.4	11.31	42.99
21.2	25.99	50.27	21.2	26.63	46.63	21.2	50.15	59.56	21.3	55.34	46.01	21.4	11.17	43.24
22.2	25.71	50.18	22.2	25.58	46.59	22.2	49.87	59.49	22.3	55.13	46.16	22.4	11.03	43.48
23.2	25.45	50.08	23.2	24.55	46.55	23.2	49.58	59.42	23.3	54.93	46.32	23.4	10.89	43.71
24.2	25.20	49.99	24.2	23.57	46.50	24.2	49.29	59.33	24.3	54.74	46.46	24.4	10.77	43.93
25.2	24.96	49.91	25.2	22.59	46.46	25.2	49.00	59.24	25.3	54.54	46.62	25.4	10.64	44.16
26.2	24.71	49.83	26.2	21.61	46.42	26.2	48.71	59.10	26.3	54.36	46.77	26.4	10.54	44.39
27.2	24.46	49.77	27.2	20.63	46.41	27.2	48.43	58.97	27.3	54.17	46.93	27.4	10.42	44.63
28.2	24.19	49.69	28.2	19.60	46.40	28.2	48.15	58.82	28.3	53.98	47.10	28.4	10.31	44.87
29.2	23.93	49.61	29.2	18.54	46.38	29.2	47.88	58.64	29.3	53.79	47.28	29.4	10.19	45.14
30.2	23.65	49.53	30.2	17.42	46.37	30.2	47.64	58.46	30.3	53.57	47.47	30.4	10.06	45.42
31.2	23.34	49.44	31.2	16.26	46.33	31.2	47.39	58.28	31.3	53.35	47.66	31.4	9.92	45.69
13.76	+13.72		51.14	+51.13		11.91	−11.87		12.32	+12.28		11.86	+11.81	
0^h	57^m	$24^s.633$	1^h	31^m	$11^s.709$	1^h	41^m	$54^s.846$	4^h	10^m	$37^s.831$	5^h	35^m	$50^s.320$
+85°	49′	24″.14	+88°	52′	20″.55	−85°	10′	45″.22	+85°	20′	28″.88	+85°	9′	34″.51

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Jan.	5 45	−84 49	Jan.	6 46	−80 43	Jan.	7 3	+87 10	Jan.	7 14	+82 34	Jan.	7 15	−86 54
	s	″		s	″		s	″		s	″		s	″
0.5	62.10	51.80	0.5	55.72	50.12	0.5	38.28	36.22	0.5	22.01	8.37	0.5	59.12	21.71
1.5	61.97	52.12	1.5	55.70	50.49	1.5	38.46	36.53	1.5	22.10	8.66	1.5	59.07	22.08
2.5	61.87	52.41	2.5	55.68	50.83	2.5	38.64	36.84	2.5	22.19	8.98	2.5	59.01	22.43
3.5	61.74	52.70	3.5	55.65	51.17	3.5	38.79	37.18	3.5	22.27	9.30	3.5	58.95	22.77
4.5	61.63	52.98	4.5	55.62	51.50	4.5	38.92	37.52	4.5	22.33	9.63	4.5	58.89	23.09
5.4	61.51	53.26	5.5	55.59	51.82	5.5	39.02	37.87	5.5	22.38	9.97	5.5	58.85	23.41
6.4	61.40	53.57	6.5	55.58	52.16	6.5	39.08	38.21	6.5	22.42	10.29	6.5	58.82	23.74
7.4	61.29	53.88	7.5	55.56	52.52	7.5	39.12	38.54	7.5	22.43	10.59	7.5	58.79	24.10
8.4	61.18	54.21	8.5	55.53	52.89	8.5	39.13	38.83	8.5	22.45	10.88	8.5	58.76	24.47
9.4	61.05	54.55	9.5	55.50	53.27	9.5	39.16	39.12	9.5	22.48	11.16	9.5	58.72	24.86
10.4	60.91	54.92	10.5	55.46	53.68	10.5	39.21	39.39	10.5	22.51	11.40	10.5	58.66	25.26
11.4	60.76	55.29	11.5	55.42	54.09	11.5	39.27	39.66	11.5	22.55	11.65	11.5	58.57	25.67
12.4	60.58	55.62	12.5	55.38	54.48	12.5	39.35	39.94	12.5	22.59	11.91	12.5	58.44	26.06
13.4	60.39	55.92	13.5	55.32	54.85	13.5	39.43	40.25	13.5	22.64	12.19	13.5	58.29	26.45
14.4	60.21	56.21	14.5	55.25	55.19	14.5	39.53	40.56	14.5	22.70	12.48	14.5	58.13	26.81
15.4	60.03	56.48	15.5	55.19	55.52	15.5	39.60	40.89	15.5	22.75	12.79	15.5	57.96	27.14
16.4	59.86	56.72	16.5	55.12	55.85	16.5	39.64	41.22	16.5	22.76	13.13	16.5	57.80	27.46
17.4	59.69	56.96	17.5	55.06	56.16	17.5	39.65	41.59	17.5	22.78	13.47	17.5	57.65	27.78
18.4	59.53	57.20	18.5	55.01	56.46	18.5	39.61	41.93	18.5	22.78	13.82	18.5	57.51	28.11
19.4	59.38	57.48	19.5	54.96	56.77	19.5	39.55	42.28	19.5	22.77	14.15	19.5	57.38	28.43
20.4	59.21	57.75	20.5	54.90	57.10	20.5	39.46	42.61	20.5	22.76	14.47	20.5	57.26	28.76
21.4	59.04	58.03	21.4	54.85	57.44	21.5	39.38	42.92	21.5	22.73	14.76	21.5	57.14	29.10
22.4	58.87	58.32	22.4	54.79	57.80	22.5	39.28	43.21	22.5	22.70	15.05	22.5	57.01	29.47
23.4	58.69	58.61	23.4	54.73	58.16	23.5	39.18	43.50	23.5	22.67	15.32	23.5	56.84	29.83
24.4	58.51	58.90	24.4	54.64	58.50	24.5	39.08	43.78	24.5	22.66	15.59	24.5	56.67	30.20
25.4	58.30	59.19	25.4	54.57	58.86	25.4	39.02	44.05	25.5	22.64	15.86	25.5	56.48	30.60
26.4	58.08	59.46	26.4	54.49	59.21	26.4	38.95	44.32	26.5	22.62	16.13	26.5	56.27	30.93
27.4	57.86	59.72	27.4	54.41	59.55	27.4	38.89	44.60	27.5	22.61	16.40	27.5	56.04	31.30
28.4	57.63	59.96	28.4	54.32	59.88	28.4	38.83	44.92	28.4	22.61	16.68	28.4	55.80	31.64
29.4	57.40	60.18	29.4	54.22	60.17	29.4	38.77	45.24	29.4	22.61	16.99	29.4	55.53	31.97
30.4	57.18	60.38	30.4	54.13	60.46	30.4	38.69	45.56	30.4	22.60	17.30	30.4	55.27	32.28
31.4	56.96	60.57	31.4	54.04	60.73	31.4	38.58	45.89	31.4	22.56	17.62	31.4	55.00	32.57

31 G. Mensæ	ζ Mensæ	51 H. Cephei	25 H. Camelop.	7 G. Octantis
11.10 −11.06	6.21 −6.13	20.31 +20.29	7.73 +7.67	18.54 −18.51
5ʰ 45ᵐ 51ˢ.396	6ʰ 46ᵐ 48ˢ.653	7ʰ 3ᵐ 2ˢ.335	7ʰ 14ᵐ 7ˢ.912	7ʰ 15ᵐ 39ˢ.691
−84° 49′ 44″.27	−80° 43′ 46″.14	+87° 10′ 43″.86	+82° 34′ 17″.32	−86° 54′ 19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	8 19	+88 52
	s	″
0.6	3.23	22.31
1.6	4.00	22.56
2.6	4.77	22.83
3.6	5.51	23.11
4.6	6.19	23.42
5.6	6.78	23.73
6.6	7.29	24.04
7.5	7.72	24.35
8.5	8.10	24.64
9.5	8.48	24.92
10.5	8.88	25.16
11.5	9.31	25.41
12.5	9.79	25.67
13.5	10.32	25.94
14.5	10.86	26.21
15.5	11.39	26.52
16.5	11.85	26.84
17.5	12.24	27.19
18.5	12.55	27.52
19.5	12.76	27.86
20.5	12.92	28.18
21.5	13.04	28.51
22.5	13.13	28.82
23.5	13.21	29.11
24.5	13.31	29.39
25.5	13.42	29.68
26.5	13.56	29.98
27.5	13.73	30.28
28.5	13.91	30.59
29.5	14.10	30.91
30.5	14.25	31.24
31.5	14.37	31.58

50.89 +50.88
8^h 17^m $47^s.546$
+88° 52′ 37″.80

ζ Octantis. Mag. 5.4

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	9 8	−85 20
	s	″
0.6	54.14	21.59
1.6	54.25	21.93
2.6	54.36	22.27
3.6	54.46	22.60
4.6	54.56	22.93
5.6	54.65	23.24
6.6	54.75	23.55
7.6	54.88	23.88
8.6	55.01	24.22
9.6	55.14	24.58
10.6	55.25	24.96
11.6	55.36	25.37
12.6	55.44	25.78
13.6	55.50	26.17
14.6	55.55	26.56
15.6	55.59	26.94
16.6	55.62	27.28
17.6	55.66	27.62
18.6	55.70	27.97
19.6	55.75	28.31
20.5	55.80	28.67
21.5	55.86	29.03
22.5	55.92	29.40
23.5	55.98	29.79
24.5	56.03	30.18
25.5	56.06	30.59
26.5	56.07	31.00
27.5	56.08	31.41
28.5	56.08	31.82
29.5	56.05	32.22
30.5	56.01	32.60
31.5	55.97	32.97

12.31 −12.27
9^h 8^m $41^s.594$
−85° 20′ 26″.78

1 H. Draconis. Mag. 4.6

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	9 25	+81 40
	s	″
0.6	47.94	48.92
1.6	48.09	49.07
2.6	48.24	49.25
3.6	48.38	49.45
4.6	48.52	49.66
5.6	48.65	49.89
6.6	48.75	50.13
7.6	48.86	50.36
8.6	48.95	50.59
9.6	49.04	50.78
10.6	49.13	50.98
11.6	49.23	51.16
12.6	49.35	51.35
13.6	49.46	51.53
14.6	49.59	51.74
15.6	49.72	51.97
16.6	49.82	52.22
17.6	49.92	52.49
18.6	50.02	52.78
19.6	50.10	53.07
20.6	50.17	53.36
21.6	50.23	53.63
22.6	50.29	53.90
23.6	50.34	54.15
24.6	50.39	54.40
25.5	50.45	54.65
26.5	50.52	54.90
27.5	50.59	55.15
28.5	50.67	55.42
29.5	50.75	55.69
30.5	50.83	55.97
31.5	50.89	56.27

6.91 +6.84
9^h 25^m $39^s.275$
+81° 41′ 10″.13

ζ Chamæleontis. Mag. 5.2

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	9 36	−80 34
	s	″
0.6	25.48	32.71
1.6	25.56	33.05
2.6	25.62	33.38
3.6	25.69	33.70
4.6	25.76	34.03
5.6	25.83	34.33
6.6	25.90	34.62
7.6	25.98	34.94
8.6	26.06	35.27
9.6	26.14	35.63
10.6	26.23	35.99
11.6	26.31	36.38
12.6	26.37	36.79
13.6	26.43	37.19
14.6	26.48	37.58
15.6	26.53	37.95
16.6	26.57	38.31
17.6	26.61	38.65
18.6	26.65	39.00
19.6	26.69	39.33
20.6	26.74	39.67
21.6	26.79	40.04
22.6	26.84	40.41
23.6	26.89	40.80
24.6	26.93	41.19
25.6	26.97	41.60
26.6	27.01	42.01
27.5	27.04	42.43
28.5	27.05	42.84
29.5	27.06	43.25
30.5	27.07	43.63
31.5	27.08	44.01

6.11 −6.03
9^h 36^m $19^s.026$
−80° 34′ 39″.26

30 H. Camelop. Mag. 5.3

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	10 21	+82 57
	s	″
0.7	26.98	53.12
1.7	27.18	53.20
2.6	27.37	53.31
3.6	27.56	53.43
4.6	27.75	53.58
5.6	27.94	53.75
6.6	28.09	53.93
7.6	28.23	54.11
8.6	28.37	54.28
9.6	28.50	54.44
10.6	28.64	54.59
11.6	28.78	54.72
12.6	28.93	54.84
13.6	29.10	54.98
14.6	29.27	55.13
15.6	29.44	55.31
16.6	29.59	55.50
17.6	29.75	55.72
18.6	29.90	55.95
19.6	30.03	56.18
20.6	30.14	56.43
21.6	30.25	56.68
22.6	30.35	56.91
23.6	30.45	57.15
24.6	30.55	57.38
25.6	30.65	57.60
26.6	30.77	57.81
27.6	30.88	58.03
28.6	31.01	58.25
29.6	31.13	58.48
30.6	31.25	58.73
31.6	31.36	59.00

8.16 +8.10
10^h 21^m $19^s.949$
+82° 58′ 17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
ash. ean me.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
n.	11 0	−84 9	Jan.	12 14	+88 8	Jan.	12 46	−84 40	Jan.	12 48	+83 50	Jan.	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
.7	2.08	18.31	0.7	26.35	29.34	0.8	22.92	47.30	0.8	28.74	45.00	0.8	34.92	4.70
.7	2.26	18.56	1.7	27.05	29.28	1.8	23.19	47.41	1.8	28.96	44.89	1.8	35.24	4.76
.7	2.44	18.81	2.7	27.80	29.22	2.7	23.44	47.52	2.8	29.19	44.78	2.8	35.53	4.81
.7	2.61	19.07	3.7	28.56	29.18	3.7	23.68	47.63	3.7	29.42	44.69	3.8	35.81	4.87
.7	2.77	19.32	4.7	29.32	29.16	4.7	23.91	47.74	4.7	29.66	44.62	4.8	36.07	4.91
.7	2.94	19.55	5.7	30.07	29.19	5.7	24.14	47.83	5.7	29.89	44.56	5.8	36.35	4.95
.7	3.11	19.76	6.7	30.78	29.22	6.7	24.37	47.92	6.7	30.11	44.52	6.8	36.63	4.96
.7	3.30	19.98	7.7	31.45	29.27	7.7	24.61	48.00	7.7	30.31	44.52	7.8	36.91	4.97
.7	3.49	20.22	8.7	32.08	29.32	8.7	24.88	48.08	8.7	30.51	44.51	8.8	37.23	5.01
.7	3.68	20.49	9.7	32.67	29.37	9.7	25.16	48.20	9.7	30.70	44.51	9.8	37.56	5.05
.7	3.89	20.77	10.7	33.25	29.39	10.7	25.45	48.33	10.7	30.88	44.48	10.8	37.89	5.10
1.7	4.09	21.08	11.7	33.84	29.40	11.7	25.74	48.48	11.7	31.07	44.45	11.8	38.24	5.19
2.6	4.27	21.41	12.7	34.44	29.41	12.7	26.03	48.66	12.7	31.26	44.41	12.7	38.58	5.32
.6	4.45	21.75	13.7	35.09	29.41	13.7	26.30	48.86	13.7	31.46	44.35	13.7	38.92	5.45
.6	4.59	22.08	14.7	35.79	29.42	14.7	26.54	49.06	14.7	31.69	44.30	14.7	39.22	5.59
.6	4.73	22.40	15.7	36.52	29.46	15.7	26.78	49.26	15.7	31.92	44.28	15.7	39.51	5.73
.6	4.87	22.70	16.7	37.25	29.52	16.7	27.01	49.45	16.7	32.16	44.27	16.7	39.79	5.86
7.6	4.99	22.99	17.7	37.98	29.61	17.7	27.22	49.63	17.7	32.38	44.30	17.7	40.06	5.98
.6	5.12	23.27	18.7	38.69	29.72	18.7	27.44	49.80	18.7	32.61	44.33	18.7	40.33	6.09
.6	5.26	23.54	19.7	39.36	29.85	19.7	27.67	49.95	19.7	32.83	44.39	19.7	40.60	6.18
.6	5.41	23.82	20.7	39.98	29.97	20.7	27.89	50.10	20.7	33.03	44.48	20.7	40.88	6.27
1.6	5.56	24.11	21.7	40.58	30.10	21.7	28.13	50.27	21.7	33.22	44.55	21.7	41.17	6.38
2.6	5.71	24.43	22.7	41.15	30.23	22.7	28.38	50.44	22.7	33.41	44.64	22.7	41.49	6.49
.6	5.87	24.74	23.7	41.71	30.36	23.7	28.63	50.63	23.7	33.60	44.72	23.7	41.80	6.62
.6	6.02	25.07	24.7	42.26	30.49	24.7	28.89	50.83	24.7	33.78	44.80	24.7	42.11	6.75
5.6	6.17	25.43	25.7	42.81	30.59	25.7	29.14	51.06	25.7	33.96	44.86	25.7	42.42	6.89
.6	6.31	25.79	26.7	43.37	30.71	26.7	29.39	51.29	26.7	34.15	44.93	26.7	42.74	7.08
7.6	6.45	26.16	27.7	43.96	30.82	27.7	29.63	51.55	27.7	34.34	44.99	27.7	43.05	7.28
.6	6.56	26.53	28.7	44.55	30.93	28.7	29.87	51.82	28.7	34.54	45.05	28.7	43.34	7.49
.6	6.66	26.90	29.7	45.19	31.06	29.7	30.09	52.09	29.7	34.75	45.11	29.7	43.63	7.70
.6	6.76	27.27	30.6	45.83	31.20	30.7	30.29	52.35	30.7	34.97	45.19	30.7	43.89	7.91
1.6	6.85	27.61	31.6	46.48	31.35	31.7	30.49	52.62	31.7	35.19	45.28	31.7	44.14	8.12
9.82		−9.77	30.83		+30.82	10.79		−10.74	9.33		+9.27	12.38		−12.34
10ʰ	59ᵐ	54ˢ.546	12ʰ	14ᵐ	29ˢ.190	12ʰ	46ᵐ	19ˢ.119	12ʰ	48ᵐ	31ˢ.308	13ʰ	27ᵐ	32ˢ.891
34°	9′	29″.33	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Jan.	14 13	−83 17	Jan.	15 2	+87 32	Jan.	15 24	−84 11	Jan.	16 54	+82 10	Jan.	17 16	−80 46
	s	″		s	″		s	″		s	″		s	″
0.8	46.34	39.91	0.8	33.48	23.92	0.9	20.27	42.02	0.9	1.43	13.83	0.9	13.29	65.42
1.8	46.56	39.90	1.8	33.83	23.65	1.9	20.51	41.89	1.9	1.48	13.46	1.9	13.40	65.17
2.8	46.76	39.89	2.8	34.20	23.39	2.9	20.73	41.76	2.9	1.52	13.08	2.9	13.50	64.93
3.8	46.96	39.88	3.8	34.61	23.12	3.9	20.93	41.64	3.9	1.58	12.69	3.9	13.60	64.70
4.8	47.16	39.87	4.8	35.03	22.87	4.9	21.13	41.52	4.9	1.67	12.34	4.9	13.70	64.48
5.8	47.35	39.86	5.8	35.47	22.64	5.9	21.34	41.40	5.9	1.74	12.00	5.9	13.79	64.24
6.8	47.54	39.82	6.8	35.91	22.44	6.8	21.54	41.27	6.9	1.82	11.67	6.9	13.87	64.00
7.8	47.74	39.78	7.8	36.35	22.26	7.8	21.74	41.13	7.9	1.91	11.37	7.9	13.96	63.73
8.8	47.96	39.73	8.8	36.76	22.09	8.8	21.97	40.98	8.9	1.99	11.09	8.9	14.05	63.45
9.8	48.18	39.69	9.8	37.14	21.92	9.8	22.20	40.83	9.9	2.07	10.83	9.9	14.15	63.17
10.8	48.42	39.67	10.8	37.50	21.75	10.8	22.47	40.68	10.9	2.13	10.57	10.9	14.28	62.89
11.8	48.67	39.67	11.8	37.85	21.58	11.8	22.74	40.56	11.9	2.20	10.31	11.9	14.40	62.61
12.8	48.92	39.72	12.8	38.22	21.39	12.8	23.02	40.47	12.9	2.28	10.02	12.9	14.54	62.37
13.8	49.15	39.77	13.8	38.61	21.19	13.8	23.29	40.41	13.9	2.36	9.71	13.9	14.69	62.14
14.8	49.38	39.85	14.8	39.03	20.97	14.8	23.54	40.36	14.9	2.44	9.40	14.9	14.83	61.95
15.8	49.60	39.94	15.8	39.49	20.76	15.8	23.79	40.32	15.9	2.52	9.07	15.9	14.97	61.76
16.8	49.80	40.00	16.8	39.96	20.56	16.8	24.03	40.28	16.9	2.63	8.75	16.9	15.09	61.57
17.8	50.00	40.05	17.8	40.46	20.37	17.8	24.26	40.23	17.9	2.74	8.43	17.9	15.20	61.40
18.8	50.20	40.10	18.8	40.98	20.23	18.8	24.48	40.18	18.9	2.85	8.14	18.9	15.31	61.21
19.8	50.39	40.14	19.8	41.49	20.09	19.8	24.70	40.12	19.9	2.96	7.86	19.9	15.42	61.01
20.8	50.59	40.18	20.8	41.97	19.99	20.8	24.93	40.04	20.9	3.09	7.61	20.9	15.53	60.79
21.8	50.81	40.21	21.8	42.45	19.89	21.8	25.16	39.96	21.9	3.20	7.38	21.9	15.64	60.57
22.8	51.03	40.26	22.8	42.92	19.80	22.8	25.40	39.88	22.9	3.31	7.15	22.9	15.77	60.34
23.8	51.26	40.30	23.8	43.37	19.72	23.8	25.67	39.82	23.9	3.42	6.93	23.9	15.91	60.12
24.7	51.48	40.38	24.8	43.82	19.63	24.8	25.94	39.76	24.9	3.53	6.73	24.9	16.05	59.90
25.7	51.72	40.46	25.8	44.26	19.53	25.8	26.20	39.72	25.9	3.65	6.52	25.9	16.19	59.69
26.7	51.96	40.56	26.8	44.70	19.44	26.8	26.48	39.70	26.9	3.76	6.30	26.9	16.34	59.49
27.7	52.20	40.69	27.8	45.16	19.35	27.8	26.75	39.70	27.9	3.87	6.06	27.9	16.49	59.31
28.7	52.42	40.83	28.8	45.63	19.24	28.8	27.03	39.72	28.8	3.99	5.81	28.9	16.66	59.17
29.7	52.64	40.97	29.8	46.11	19.12	29.8	27.31	39.75	29.8	4.11	5.56	29.9	16.81	59.02
30.7	52.84	41.12	30.8	46.62	19.01	30.8	27.54	39.79	30.8	4.24	5.29	30.9	16.97	58.89
31.7	53.04	41.26	31.8	47.15	18.91	31.8	27.79	39.83	31.8	4.37	5.04	31.9	17.12	58.77
	8.56	−8.50		23.29	+23.27		9.89	−9.84		7.34	+7.27		6.24	−6.16
14h	13m	46s.350	15h	3m	2s.510	15h	24m	23s.351	16h	54m	12s.991	17h	16m	17s.234
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.27

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Jan.	17 57	+86 36	Jan.	18 7	−87 39	Jan.	18 58	+89 1	Jan.	19 29	−89 13	Jan.	20 48	+82 14
	s	″		s	″		s	″		s	″		s	″
0.9	53.00	50.84	0.9	2.14	44.60	1.0	34.74	19.75	1.0	38.48	12.28	1.1	23.38	14.61
1.9	52.99	50.48	1.9	2.42	44.29	2.0	34.29	19.43	2.0	38.68	11.92	2.1	23.27	14.34
2.9	52.98	50.12	2.9	2.68	43.99	3.0	33.88	19.09	3.0	38.91	11.57	3.1	23.16	14.08
3.9	52.99	49.73	3.9	2.93	43.70	4.0	33.53	18.72	4.0	39.11	11.24	4.1	23.04	13.79
4.9	53.03	49.35	4.9	3.18	43.42	5.0	33.27	18.36	5.0	39.27	10.92	5.1	22.94	13.48
5.9	53.10	49.00	5.9	3.41	43.13	5.9	33.11	18.02	6.0	39.37	10.59	6.1	22.86	13.16
6.9	53.19	48.67	6.9	3.61	42.81	6.9	33.04	17.68	7.0	39.40	10.26	7.1	22.77	12.86
7.9	53.27	48.34	7.9	3.82	42.50	7.9	33.00	17.36	8.0	39.41	9.90	8.1	22.71	12.57
8.9	53.36	48.05	8.9	4.05	42.17	8.9	33.00	17.05	9.0	39.47	9.53	9.1	22.65	12.29
9.9	53.45	47.76	9.9	4.33	41.82	9.9	32.97	16.76	10.0	39.61	9.13	10.1	22.59	12.02
10.9	53.52	47.48	10.9	4.65	41.47	10.9	32.90	16.47	11.0	39.85	8.72	11.1	22.53	11.77
11.9	53.58	47.19	11.9	5.00	41.12	11.9	32.77	16.19	12.0	40.24	8.32	12.1	22.46	11.53
12.9	53.63	46.88	12.9	5.40	40.79	12.9	32.60	15.88	13.0	40.78	7.94	13.1	22.38	11.28
13.9	53.68	46.55	13.9	5.81	40.50	13.9	32.42	15.56	13.9	41.38	7.57	14.1	22.30	11.00
14.9	53.75	46.22	14.9	6.23	40.21	14.9	32.27	15.22	14.9	42.03	7.20	15.0	22.23	10.72
15.9	53.84	45.87	15.9	6.63	39.94	15.9	32.18	14.88	15.9	42.66	6.86	16.0	22.15	10.41
16.9	53.96	45.52	16.9	7.01	39.70	16.9	32.19	14.51	16.9	43.24	6.54	17.0	22.08	10.09
17.9	54.09	45.17	17.9	7.35	39.46	17.9	32.28	14.16	17.9	43.77	6.22	18.0	22.02	9.74
18.9	54.24	44.84	18.9	7.68	39.20	18.9	32.47	13.82	18.9	44.23	5.92	19.0	21.97	9.39
19.9	54.42	44.53	19.9	8.00	38.93	19.9	32.74	13.48	19.9	44.64	5.59	20.0	21.93	9.05
20.9	54.60	44.24	20.9	8.32	38.64	20.9	33.04	13.15	20.9	45.04	5.26	21.0	21.89	8.72
21.9	54.78	43.96	21.9	8.66	38.35	21.9	33.36	12.84	21.9	45.47	4.92	22.0	21.86	8.39
22.9	54.97	43.68	22.9	9.03	38.06	22.9	33.69	12.55	22.9	45.96	4.55	23.0	21.83	8.07
23.9	55.16	43.41	23.9	9.43	37.74	23.9	34.02	12.25	23.9	46.52	4.18	24.0	21.80	7.78
24.9	55.33	43.14	24.9	9.85	37.43	24.9	34.31	11.96	24.9	47.16	3.81	25.0	21.79	7.48
25.9	55.50	42.88	25.9	10.30	37.14	25.9	34.60	11.68	25.9	47.90	3.45	26.0	21.77	7.19
26.9	55.65	42.62	26.9	10.77	36.86	26.9	34.86	11.40	26.9	48.74	3.10	27.0	21.74	6.89
27.9	55.82	42.35	27.9	11.28	36.60	27.9	35.09	11.11	27.9	49.65	2.75	28.0	21.71	6.58
28.9	55.99	42.07	28.9	11.79	36.36	28.9	35.33	10.80	28.9	50.63	2.42	29.0	21.68	6.26
29.9	56.18	41.78	29.9	12.30	36.13	29.9	35.60	10.48	29.9	51.65	2.09	30.0	21.65	5.93
30.9	56.37	41.48	30.9	12.81	35.93	30.9	35.92	10.15	30.9	52.65	1.78	31.0	21.62	5.60
31.9	56.58	41.18	31.9	13.29	35.73	31.9	36.31	9.81	31.9	53.62	1.47	32.0	21.61	5.23
16.93		+16.90	24.50		−24.48	58.52		+58.51	73.32		−73.32	7.40		+7.34
17^h	58^m	$22^s.311$	18^h	7^m	$23^s.343$	19^h	0^m	$15^s.079$	19^h	30^m	$50^s.769$	20^h	48^m	$32^s.146$
+86°	36′	51″.04	−87°	39′	50″.89	+89°	1′	12″.80	−89°	13′	13″.35	+82°	13′	56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	21 38	−83 5
	s	″
1.1	32.20	41.36
2.1	32.14	41.08
3.1	32.08	40.80
4.1	32.00	40.52
5.1	31.93	40.25
6.1	31.86	39.99
7.1	31.77	39.71
8.1	31.67	39.42
9.1	31.57	39.11
10.1	31.48	38.79
11.1	31.39	38.44
12.1	31.32	38.07
13.1	31.27	37.69
14.1	31.23	37.34
15.1	31.20	37.00
16.1	31.18	36.66
17.1	31.15	36.34
18.1	31.11	36.04
19.1	31.07	35.73
20.1	31.02	35.44
21.1	30.96	35.13
22.1	30.90	34.80
23.1	30.85	34.45
24.1	30.80	34.09
25.1	30.76	33.73
26.1	30.72	33.35
27.1	30.69	32.97
28.0	30.71	32.58
29.0	30.72	32.20
30.0	30.73	31.84
31.0	30.74	31.50
32.0	30.75	31.16
	8.32	−8.26
	$21^h\ 38^m\ 38^s.548$	
	$-83°\ 5'\ 34''.33$	

ν Octantis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	22 16	−86 22
	s	″
1.1	21.59	60.03
2.1	21.40	59.77
3.1	21.21	59.50
4.1	21.02	59.26
5.1	20.83	59.02
6.1	20.62	58.76
7.1	20.39	58.50
8.1	20.15	58.24
9.1	19.91	57.96
10.1	19.66	57.65
11.1	19.42	57.33
12.1	19.22	56.99
13.1	19.05	56.63
14.1	18.91	56.29
15.1	18.77	55.96
16.1	18.65	55.64
17.1	18.53	55.33
18.1	18.40	55.02
19.1	18.26	54.73
20.1	18.09	54.43
21.1	17.92	54.14
22.1	17.74	53.83
23.1	17.57	53.50
24.1	17.40	53.15
25.1	17.26	52.79
26.1	17.13	52.41
27.1	17.03	52.03
28.1	16.93	51.65
29.1	16.87	51.26
30.1	16.82	50.89
31.1	16.78	50.53
32.1	16.74	50.20
	15.85	−15.82
	$22^h\ 16^m\ 33^s.212$	
	$-86°\ 22'\ 50''.92$	

β Octantis. Mag. 4.3		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	22 37	−81 48
	s	″
1.2	47.50	34.96
2.2	47.40	34.71
3.2	47.30	34.46
4.2	47.21	34.23
5.2	47.13	34.02
6.2	47.03	33.81
7.1	46.92	33.60
8.1	46.79	33.37
9.1	46.68	33.12
10.1	46.57	32.85
11.1	46.46	32.56
12.1	46.36	32.24
13.1	46.28	31.92
14.1	46.20	31.60
15.1	46.14	31.30
16.1	46.09	31.01
17.1	46.03	30.73
18.1	45.95	30.45
19.1	45.87	30.19
20.1	45.78	29.93
21.1	45.70	29.66
22.1	45.61	29.37
23.1	45.52	29.08
24.1	45.44	28.76
25.1	45.37	28.43
26.1	45.29	28.07
27.1	45.24	27.70
28.1	45.20	27.34
29.1	45.15	26.99
30.1	45.12	26.65
31.1	45.09	26.31
32.1	45.06	25.99
	7.02	−6.95
	$22^h\ 37^m\ 51^s.624$	
	$-81°\ 48'\ 24''.80$	

39 H. Cephei. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	23 27	+86 52
	s	″
1.2	40.04	5.16
2.2	39.62	5.13
3.2	39.20	5.09
4.2	38.78	5.04
5.2	38.35	4.95
6.2	37.94	4.85
7.2	37.56	4.72
8.2	37.21	4.60
9.2	36.88	4.48
10.2	36.56	4.37
11.2	36.25	4.27
12.2	35.94	4.19
13.2	35.59	4.12
14.2	35.23	4.04
15.2	34.86	3.95
16.2	34.45	3.81
17.2	34.06	3.65
18.2	33.68	3.48
19.1	33.32	3.29
20.1	32.98	3.09
21.1	32.66	2.89
22.1	32.37	2.69
23.1	32.08	2.50
24.1	31.80	2.31
25.1	31.53	2.14
26.1	31.26	1.96
27.1	30.98	1.79
28.1	30.69	1.62
29.1	30.38	1.43
30.1	30.06	1.24
31.1	29.74	1.02
32.1	29.41	0.79
	18.30	+18.27
	$23^h\ 27^m\ 43^s.571$	
	$+86°\ 51'\ 38''.62$	

γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Jan.	23 47	−82 28
	s	″
1.2	20.84	21.41
2.2	20.70	21.24
3.2	20.57	21.08
4.2	20.44	20.93
5.2	20.31	20.79
6.2	20.17	20.65
7.2	20.02	20.52
8.2	19.87	20.38
9.2	19.70	20.22
10.2	19.53	20.04
11.2	19.37	19.83
12.2	19.22	19.61
13.2	19.08	19.37
14.2	18.95	19.13
15.2	18.85	18.88
16.2	18.74	18.63
17.2	18.64	18.41
18.2	18.51	18.19
19.2	18.39	18.00
20.2	18.26	17.79
21.2	18.13	17.59
22.2	17.99	17.37
23.2	17.85	17.14
24.1	17.71	16.90
25.1	17.57	16.63
26.1	17.45	16.36
27.1	17.32	16.07
28.1	17.23	15.76
29.1	17.13	15.45
30.1	17.04	15.14
31.1	16.96	14.85
32.1	16.87	14.56
	7.63	−7.57
	$23^h\ 47^m\ 23^s.637$	
	$-82°\ 28'\ 8''.42$	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
ash. ean me.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
b.	0 57	+85 49	Feb.	1 30	+88 52	Feb.	1 41	−85 10	Feb.	4 10	+85 20	Feb.	5 36	+85 9
	s	″		s	″		s	″		s	″		s	″
0.2	23.34	49.44	0.2	76.26	46.33	0.2	47.39	58.28	0.3	53.35	47.66	0.4	9.92	45.69
1.2	23.04	49.32	1.2	75.09	46.27	1.2	47.16	58.11	1.3	53.11	47.84	1.4	9.74	45.94
2.2	22.75	49.18	2.2	73.91	46.18	2.2	46.93	57.95	2.3	52.86	47.98	2.4	9.56	46.18
3.2	22.47	49.03	3.2	72.77	46.08	3.2	46.69	57.80	3.3	52.59	48.09	3.4	9.36	46.42
4.2	22.20	48.85	4.2	71.70	45.95	4.2	46.45	57.66	4.3	52.34	48.19	4.4	9.15	46.62
5.2	21.96	48.67	5.2	70.71	45.82	5.2	46.17	57.53	5.3	52.09	48.28	5.4	8.96	46.80
6.2	21.73	48.49	6.2	69.80	45.69	6.2	45.88	57.39	6.3	51.85	48.34	6.4	8.77	46.95
7.2	21.53	48.34	7.2	68.93	45.57	7.2	45.60	57.20	7.3	51.64	48.40	7.4	8.60	47.12
8.2	21.32	48.19	8.2	68.08	45.47	8.2	45.32	57.01	8.3	51.44	48.48	8.3	8.45	47.29
9.2	21.12	48.06	9.2	67.21	45.38	9.2	45.04	56.78	9.3	51.23	48.56	9.3	8.30	47.47
0.2	20.89	47.92	10.2	66.29	45.29	10.2	44.79	56.55	10.3	51.03	48.66	10.3	8.15	47.66
1.1	20.65	47.77	11.2	65.30	45.20	11.2	44.55	56.30	11.3	50.81	48.77	11.3	7.98	47.86
2.1	20.38	47.62	12.2	64.25	45.10	12.2	44.33	56.05	12.3	50.57	48.88	12.3	7.80	48.09
3.1	20.12	47.45	13.2	63.18	44.96	13.2	44.13	55.81	13.3	50.31	49.00	13.3	7.61	48.31
4.1	19.85	47.26	14.2	62.09	44.84	14.2	43.91	55.58	14.3	50.03	49.08	14.3	7.38	48.51
5.1	19.60	47.04	15.2	61.03	44.67	15.2	43.69	55.38	15.3	49.75	49.16	15.3	7.14	48.70
6.1	19.36	46.81	16.2	60.02	44.48	16.2	43.48	55.17	16.3	49.47	49.20	16.3	6.91	48.85
7.1	19.12	46 58	17.2	59.06	44.26	17.2	43.26	54.97	17.3	49.19	49.21	17.3	6.67	49.00
8.1	18.93	46.33	18.2	58.15	44.04	18.2	43.02	54.76	18.3	48.92	49.21	18.3	6.42	49.14
9.1	18.73	46.08	19.2	57.30	43.84	19.2	42.78	54.55	19.3	48.64	49.21	19.3	6.18	49.24
0.1	18.54	45.84	20.1	56.50	43.63	20.2	42.54	54.32	20.3	48.40	49.20	20.3	5.95	49.35
1.1	18.37	45.60	21.1	55.73	43.43	21.2	42.29	54.08	21.3	48.15	49.19	21.3	5.73	49.44
2.1	18.20	45.38	22.1	54.97	43.24	22.1	42.05	53.82	22.3	47.92	49.18	22.3	5.53	49.54
3.1	18.03	45.16	23.1	54.22	43.05	23.1	41.81	53.55	23.3	47.69	49.17	23.3	5.33	49.64
4.1	17.86	44.93	24.1	53.45	42.86	24.1	41.59	53.27	24.2	47.46	49.17	24.3	5.12	49.74
5.1	17.68	44.72	25.1	52.66	42.67	25.1	41.39	52.96	25.2	47.22	49.18	25.3	4.92	49.87
6.1	17.49	44.50	26.1	51.81	42.48	26.1	41.19	52.65	26.2	46.99	49.20	26.3	4.70	49.99
7.1	17.29	44.27	27.1	50.93	42.29	27.1	41.00	52.34	27.2	46.72	49.21	27.3	4.48	50.12
8.1	17.09	44.04	28.1	50.05	42.08	28.1	40.83	52.05	28.2	46.46	49.22	28.3	4.25	50.25
9.1	16.88	43.78	29.1	49.16	41.85	29.1	40.65	51.76	29.2	46.17	49.22	29.3	3.98	50.36
0.1	16.69	43.50	30.1	48.31	41.61	30.1	40.47	51.47	30.2	45.89	49.18	30.3	3.72	50.45
1.1	16.51	43.18	31.1	47.53	41.34	31.1	40.30	51.19	31.2	45.60	49.13	31.3	3.45	50.50
13.75	+13.72		51.12	+51.11		11.91	−11.86		12.33	+12.29		11.86	+11.82	
0^h	57^m	$24^s.633$	1^h	31^m	$11^s.709$	1^h	41^m	$54^s.846$	4^h	10^m	$37^s.831$	5^h	35^m	$50^s.330$
85°	49′	24″.14	+88°	52′	20″.55	−85°	10′	45″.22	+85°	20′	28″.88	+85°	9′	34″.51

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Feb.	5 45	−84 50
	s	″
0.4	56.96	0.57
1.4	56.74	0.76
2.4	56.54	0.96
3.4	56.33	1.16
4.4	56.12	1.39
5.4	55.90	1.63
6.4	55.68	1.87
7.4	55.43	2.11
8.4	55.16	2.35
9.4	54.90	2.55
10.4	54.63	2.73
11.3	54.36	2.89
12.3	54.11	3.03
13.3	53.86	3.16
14.3	53.62	3.29
15.3	53.38	3.43
16.3	53.15	3.57
17.3	52.91	3.72
18.3	52.67	3.90
19.3	52.41	4.05
20.3	52.16	4.21
21.3	51.89	4.37
22.3	51.61	4.52
23.3	51.33	4.67
24.3	51.04	4.79
25.3	50.75	4.89
26.3	50.47	4.98
27.3	50.18	5.04
28.3	49.91	5.08
29.3	49.64	5.13
30.3	49.37	5.22
31.3	49.13	5.30

11.11 −11.06
5h 45m 51s.396
−84° 49′ 44″.27

ζ Mensæ. Mag. 5.6

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Feb.	6 46	−80 44
	s	″
0.4	54.04	0.73
1.4	53.95	1.00
2.4	53.85	1.27
3.4	53.76	1.55
4.4	53.67	1.86
5.4	53.58	2.17
6.4	53.49	2.49
7.4	53.39	2.83
8.4	53.28	3.15
9.4	53.16	3.45
10.4	53.05	3.73
11.4	52.92	3.97
12.4	52.79	4.20
13.4	52.67	4.42
14.4	52.56	4.64
15.4	52.46	4.86
16.4	52.35	5.08
17.4	52.24	5.32
18.4	52.12	5.57
19.4	51.99	5.84
20.4	51.88	6.10
21.4	51.75	6.37
22.4	51.62	6.61
23.4	51.49	6.83
24.4	51.35	7.05
25.4	51.21	7.25
26.3	51.08	7.43
27.3	50.93	7.59
28.3	50.79	7.74
29.3	50.65	7.90
30.3	50.52	8.05
31.3	50.39	8.23

6.21 −6.13
6h 46m 48s.653
−80° 43′ 46″.14

51 H. Cephei. Mag. 5.3

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Feb.	7 3	+87 10
	s	″
0.4	38.58	45.89
1.4	38.44	46.22
2.4	38.28	46.54
3.4	38.09	46.85
4.4	37.86	47.14
5.4	37.64	47.39
6.4	37.44	47.63
7.4	37.25	47.87
8.4	37.10	48.10
9.4	36.95	48.36
10.4	36.80	48.62
11.4	36.63	48.89
12.4	36.46	49.17
13.4	36.24	49.47
14.4	35.99	49.77
15.4	35.71	50.05
16.4	35.40	50.32
17.4	35.09	50.56
18.4	34.76	50.80
19.4	34.45	51.01
20.4	34.14	51.21
21.4	33.84	51.41
22.4	33.55	51.60
23.4	33.27	51.80
24.4	33.00	52.01
25.4	32.74	52.23
26.4	32.46	52.46
27.4	32.18	52.69
28.4	31.86	52.93
29.4	31.50	53.15
30.3	31.13	53.36
31.3	30.73	53.55

20.33 +20.31
7h 3m 2s.335
+87° 10′ 43″.86

25 H. Camelop. Mag. 5.1

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Feb.	7 14	+82 34
	s	″
0.4	22.56	17.62
1.4	22.52	17.95
2.4	22.47	18.28
3.4	22.41	18.59
4.4	22.34	18.88
5.4	22.27	19.13
6.4	22.20	19.36
7.4	22.13	19.59
8.4	22.08	19.82
9.4	22.04	20.05
10.4	22.00	20.31
11.4	21.96	20.59
12.4	21.90	20.88
13.4	21.83	21.18
14.4	21.74	21.47
15.4	21.64	21.75
16.4	21.54	22.02
17.4	21.43	22.27
18.4	21.31	22.50
19.4	21.20	22.72
20.4	21.09	22.92
21.4	20.98	23.12
22.4	20.88	23.31
23.4	20.79	23.52
24.4	20.69	23.74
25.4	20.60	23.96
26.4	20.51	24.19
27.4	20.42	24.42
28.4	20.31	24.65
29.4	20.18	24.90
30.4	20.04	25.11
31.4	19.89	25.31

7.74 +7.67
7h 14m 7s.912
+82° 34′ 17″.32

7 G. Octantis. Mag. 6.4

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Feb.	7 15	−86 54
	s	″
0.4	55.00	32.57
1.4	54.76	32.85
2.4	54.52	33.14
3.4	54.29	33.45
4.4	54.07	33.76
5.4	53.84	34.09
6.4	53.58	34.44
7.4	53.31	34.79
8.4	53.01	35.13
9.4	52.69	35.46
10.4	52.35	35.76
11.4	52.01	36.05
12.4	51.66	36.32
13.4	51.33	36.56
14.4	51.00	36.81
15.4	50.69	37.06
16.4	50.40	37.33
17.4	50.11	37.60
18.4	49.80	37.89
19.4	49.49	38.17
20.4	49.17	38.45
21.4	48.81	38.74
22.4	48.45	39.02
23.4	48.07	39.29
24.4	47.68	39.54
25.4	47.27	39.78
26.4	46.85	40.01
27.4	46.44	40.21
28.4	46.06	40.41
29.4	45.67	40.59
30.4	45.29	40.78
31.4	44.93	41.00

18.55 −18.53
7h 15m 39s.691
−86° 54′ 19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Feb.	8 19	+88 52	Feb.	9 8	−85 20	Feb.	9 25	+81 40	Feb.	9 36	−80 34	Feb.	10 21	+82 57
	s	″		s	″		s	″		s	″		s	″
0.5	14.37	31.58	0.5	55.97	32.97	0.5	50.89	56.27	0.5	27.08	44.01	0.6	31.36	59.00
1.5	14.40	31.94	1.5	55.94	33.31	1.5	50.95	56.60	1.5	27.09	44.36	1.6	31.47	59.28
2.5	14.37	32.30	2.5	55.92	33.66	2.5	50.99	56.93	2.5	27.09	44.70	2.6	31.57	59.57
3.5	14.23	32.64	3.5	55.91	34.02	3.5	51.03	57.26	3.5	27.10	45.07	3.6	31.65	59.87
4.5	14.03	32.97	4.5	55.90	34.38	4.5	51.04	57.56	4.5	27.12	45.44	4.6	31.71	60.16
5.5	13.80	33.26	5.5	55.89	34.75	5.5	51.05	57.85	5.5	27.14	45.84	5.6	31.77	60.44
6.5	13.57	33.55	6.5	55.88	35.17	6.5	51.07	58.13	6.5	27.15	46.25	6.6	31.83	60.72
7.5	13.37	33.82	7.5	55.87	35.59	7.5	51.09	58.39	7.5	27.17	46.67	7.6	31.88	60.97
8.5	13.22	34.08	8.5	55.82	36.03	8.5	51.12	58.65	8.5	27.18	47.11	8.5	31.94	61.21
9.5	13.13	34.36	9.5	55.77	36.45	9.5	51.16	58.91	9.5	27.18	47.55	9.5	32.02	61.45
10.5	13.06	34.65	10.5	55.68	36.86	10.5	51.20	59.18	10.5	27.17	47.97	10.5	32.11	61.71
11.5	12.98	34.97	11.5	55.59	37.24	11.5	51.24	59.46	11.5	27.15	48.37	11.5	32.20	61.98
12.5	12.86	35.29	12.5	55.49	37.61	12.5	51.27	59.78	12.5	27.13	48.74	12.5	32.28	62.26
13.4	12.67	35.63	13.5	55.39	37.94	13.5	51.31	60.10	13.5	27.10	49.11	13.5	32.34	62.57
14.4	12.40	35.97	14.5	55.31	38.28	14.5	51.32	60.44	14.5	27.07	49.47	14.5	32.41	62.89
15.4	12.04	36.31	15.5	55.22	38.62	15.5	51.31	60.78	15.5	27.04	49.83	15.5	32.46	63.23
16.4	11.60	36.64	16.5	55.15	38.98	16.5	51.30	61.11	16.5	27.03	50.19	16.5	32.49	63.56
17.4	11.13	36.93	17.5	55.09	39.34	17.5	51.28	61.44	17.5	27.02	50.57	17.5	32.50	63.89
18.4	10.62	37.22	18.5	55.02	39.70	18.5	51.25	61.75	18.5	27.01	50.95	18.5	32.52	64.21
19.4	10.10	37.51	19.5	54.94	40.07	19.5	51.22	62.04	19.5	26.99	51.32	19.5	32.53	64.52
20.4	9.58	37.79	20.5	54.86	40.45	20.5	51.19	62.33	20.5	26.97	51.72	20.5	32.54	64.83
21.4	9.10	38.06	21.5	54.77	40.84	21.5	51.18	62.62	21.5	26.95	52.13	21.5	32.55	65.12
22.4	8.62	38.31	22.5	54.67	41.24	22.5	51.17	62.89	22.5	26.92	52.53	22.5	32.57	65.40
23.4	8.18	38.57	23.5	54.56	41.63	23.5	51.15	63.16	23.5	26.89	52.92	23.5	32.59	65.68
24.4	7.75	38.84	24.5	54.43	42.02	24.5	51.13	63.44	24.5	26.85	53.31	24.5	32.60	65.96
25.4	7.35	39.11	25.5	54.29	42.40	25.5	51.13	63.73	25.5	26.80	53.71	25.5	32.64	66.25
26.4	6.94	39.40	26.4	54.13	42.74	26.5	51.12	64.02	26.5	26.75	54.10	26.5	32.67	66.56
27.4	6.49	39.69	27.4	53.97	43.08	27.5	51.11	64.34	27.5	26.69	54.47	27.5	32.70	66.88
28.4	5.97	39.99	28.4	53.82	43.42	28.5	51.08	64.67	28.5	26.64	54.81	28.5	32.71	67.20
29.4	5.38	40.29	29.4	53.67	43.74	29.5	51.05	64.99	29.5	26.58	55.15	29.5	32.72	67.54
30.4	4.71	40.58	30.4	53.52	44.06	30.4	51.00	65.31	30.5	26.52	55.48	30.5	32.71	67.89
31.4	3.98	40.86	31.4	53.39	44.37	31.4	50.95	65.63	31.5	26.47	55.82	31.5	32.67	68.23
	51.01	+51.00		12.32	−12.28		6.91	+6.84		6.11	−6.03		8.17	+8.11
	8^h 17^m $47^s.546$			9^h 8^m $41^s.594$			9^h 25^m $39^s.275$			9^h 36^m $19^s.026$			10^h 21^m $19^s.949$	
	+88° 52′ 37″.80			−85° 20′ 26″.78			+81° 41′ 10″.13			−80° 34′ 39″.26			+82° 58′ 17″.67	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Feb.	11 0	−84 9	Feb.	12 14	+88 8	Feb.	12 46	−84 40	Feb.	12 48	+83 50	Feb.	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
0.6	6.85	27.61	0.6	46.48	31.35	0.7	30.49	52.62	0.7	35.19	45.28	0.7	44.14	8.12
1.6	6.93	27.95	1.6	47.11	31.53	1.7	30.67	52.86	1.7	35.39	45.40	1.7	44.38	8.32
2.6	7.01	28.28	2.6	47.73	31.72	2.7	30.86	53.10	2.7	35.59	45.53	2.7	44.63	8.51
3.6	7.10	28.61	3.6	48.29	31.92	3.7	31.06	53.33	3.7	35.78	45.70	3.7	44.90	8.68
4.6	7.21	28.94	4.6	48.80	32.13	4.7	31.28	53.55	4.7	35.96	45.87	4.7	45.16	8.85
5.6	7.34	29.30	5.6	49.26	32.34	5.7	31.50	53.79	5.7	36.11	46.04	5.7	45.44	9.02
6.6	7.46	29.67	6.6	49.68	32.55	6.7	31.72	54.06	6.7	36.26	46.19	6.7	45.75	9.22
7.6	7.57	30.05	7.6	50.11	32.74	7.7	31.96	54.35	7.7	36.42	46.35	7.7	46.06	9.44
8.6	7.67	30.47	8.6	50.56	32.90	8.6	32.19	54.67	8.6	36.59	46.49	8.7	46.36	9.68
9.6	7.76	30.88	9.6	51.02	33.07	9.6	32.41	54.99	9.6	36.76	46.61	9.7	46.65	9.96
10.6	7.82	31.30	10.6	51.53	33.25	10.6	32.61	55.32	10.6	36.93	46.74	10.7	46.93	10.25
11.6	7.88	31.71	11.6	52.07	33.44	11.6	32.80	55.64	11.6	37.11	46.87	11.7	47.17	10.54
12.6	7.93	32.09	12.6	52.62	33.64	12.6	32.97	55.97	12.6	37.29	47.03	12.7	47.40	10.81
13.6	7.97	32.47	13.6	53.17	33.86	13.6	33.12	56.28	13.6	37.49	47.21	13.7	47.62	11.07
14.6	8.01	32.84	14.6	53.69	34.10	14.6	33.27	56.57	14.6	37.67	47.40	14.7	47.84	11.34
15.6	8.06	33.18	15.6	54.17	34.37	15.6	33.42	56.86	15.6	37.84	47.62	15.7	48.06	11.58
16.6	8.10	33.54	16.6	54.60	34.65	16.6	33.60	57.14	16.6	37.99	47.85	16.7	48.28	11.80
17.5	8.16	33.90	17.6	55.00	34.93	17.6	33.76	57.42	17.6	38.15	48.09	17.7	48.51	12.03
18.5	8.22	34.26	18.6	55.36	35.21	18.6	33.94	57.70	18.6	38.28	48.33	18.6	48.76	12.26
19.5	8.28	34.64	19.6	55.69	35.49	19.6	34.12	57.99	19.6	38.41	48.57	19.6	49.00	12.53
20.5	8.34	35.03	20.6	56.02	35.77	20.6	34.31	58.30	20.6	38.53	48.82	20.6	49.25	12.79
21.5	8.40	35.44	21.6	56.34	36.02	21.6	34.49	58.62	21.6	38.65	49.06	21.6	49.50	13.07
22.5	8.46	35.85	22.6	56.66	36.27	22.6	34.67	58.97	22.6	38.78	49.28	22.6	49.76	13.36
23.5	8.50	36.26	23.6	56.98	36.51	23.6	34.84	59.33	23.6	38.91	49.48	23.6	50.00	13.67
24.5	8.52	36.67	24.6	57.32	36.75	24.6	35.00	59.70	24.6	39.04	49.68	24.6	50.23	13.99
25.5	8.53	37.09	25.6	57.69	36.99	25.6	35.15	60.06	25.6	39.18	49.89	25.6	50.46	14.32
26.5	8.53	37.50	26.6	58.06	37.25	26.6	35.28	60.43	26.6	39.32	50.11	26.6	50.65	14.65
27.5	8.53	37.88	27.6	58.44	37.52	27.6	35.41	60.79	27.6	39.47	50.34	27.6	50.84	14.98
28.5	8.53	38.27	28.6	58.82	37.80	28.6	35.51	61.14	28.6	39.61	50.58	28.6	51.02	15.31
29.5	8.52	38.64	29.6	59.17	38.11	29.6	35.61	61.48	29.6	39.74	50.86	29.6	51.19	15.62
30.5	8.52	39.00	30.6	59.48	38.43	30.6	35.74	61.81	30.6	39.85	51.14	30.6	51.37	15.92
31.5	8.52	39.36	31.6	59.72	38.76	31.6	35.86	62.14	31.6	39.96	51.45	31.6	51.56	16.21
	9.83	−9.78		30.86	+30.84		10.79	−10.74		9.33	+9.28		12.39	−12.35
10^h	59^m	$54^s.546$	12^h	14^m	$29^s.190$	12^h	46^m	$19^s.119$	12^h	48^m	$31^s.308$	13^h	27^m	$32^s.891$
−84°	9′	29″.33	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Feb.	14 13	−83 17	Feb.	15 2	+87 32	Feb.	15 24	−84 11	Feb.	16 54	+82 10	Feb.	17 16	−80 46
	s	″		s	″		s	″		s	″		s	″
0.7	53.04	41.26	0.8	47.15	18.91	0.8	27.79	39.83	0.8	4.37	5.04	0.9	17.12	58.77
1.7	53.24	41.40	1.8	47.70	18.84	1.8	28.03	39.88	1.8	4.51	4.80	1.9	17.25	58.64
2.7	53.42	41.53	2.8	48.26	18.79	2.8	28.26	39.90	2.8	4.66	4.60	2.9	17.39	58.51
3.7	53.61	41.64	3.8	48.79	18.78	3.8	28.50	39.91	3.8	4.80	4.40	3.8	17.52	58.36
4.7	53.81	41.75	4.8	49.30	18.77	4.8	28.74	39.91	4.8	4.95	4.23	4.8	17.65	58.20
5.7	54.04	41.88	5.7	49.78	18.77	5.8	29.01	39.91	5.8	5.10	4.10	5.8	17.80	58.03
6.7	54.26	42.00	6.7	50.25	18.78	6.8	29.28	39.91	6.8	5.23	3.96	6.8	17.95	57.86
7.7	54.50	42.15	7.7	50.68	18.79	7.8	29.55	39.94	7.8	5.36	3.82	7.8	18.12	57.69
8.7	54.74	42.33	8.7	51.11	18.78	8.8	29.85	39.99	8.8	5.50	3.68	8.8	18.30	57.54
9.7	54.97	42.53	9.7	51.57	18.74	9.8	30.14	40.06	9.8	5.63	3.50	9.8	18.48	57.42
10.7	55.18	42.75	10.7	52.04	18.70	10.8	30.43	40.15	10.8	5.77	3.32	10.8	18.66	57.33
11.7	55.39	42.97	11.7	52.55	18.67	11.7	30.70	40.28	11.8	5.90	3.14	11.8	18.84	57.26
12.7	55.59	43.20	12.7	53.07	18.65	12.7	30.95	40.39	12.8	6.05	2.95	12.8	19.00	57.20
13.7	55.77	43.40	13.7	53.63	18.65	13.7	31.18	40.50	13.8	6.20	2.77	13.8	19.15	57.14
14.7	55.94	43.60	14.7	54.18	18.66	14.7	31.41	40.59	14.8	6.38	2.62	14.8	19.30	57.06
15.7	56.11	43.79	15.7	54.72	18.70	15.7	31.64	40.69	15.8	6.54	2.49	15.8	19.44	56.98
16.7	56.29	43.96	16.7	55.25	18.75	16.7	31.87	40.75	16.8	6.71	2.38	16.8	19.58	56.89
17.7	56.48	44.13	17.7	55.77	18.85	17.7	32.11	40.82	17.8	6.88	2.29	17.8	19.72	56.80
18.7	56.66	44.31	18.7	56.26	18.94	18.7	32.35	40.89	18.8	7.03	2.22	18.8	19.88	56.70
19.7	56.86	44.51	19.7	56.74	19.03	19.7	32.60	40.97	19.8	7.19	2.16	19.8	20.03	56.60
20.7	57.06	44.71	20.7	57.21	19.11	20.7	32.87	41.05	20.8	7.34	2.10	20.8	20.21	56.50
21.7	57.26	44.93	21.7	57.66	19.20	21.7	33.13	41.15	21.8	7.49	2.05	21.8	20.37	56.40
22.7	57.47	45.15	22.7	58.10	19.29	22.7	33.40	41.26	22.8	7.64	1.99	22.8	20.55	56.33
23.7	57.68	45.39	23.7	58.55	19.37	23.7	33.67	41.39	23.8	7.79	1.91	23.8	20.72	56.27
24.7	57.87	45.66	24.7	59.00	19.44	24.7	33.94	41.55	24.8	7.94	1.83	24.8	20.91	56.23
25.7	58.06	45.94	25.7	59.46	19.50	25.7	34.21	41.72	25.8	8.09	1.75	25.8	21.10	56.21
26.7	58.24	46.21	26.7	59.94	19.56	26.7	34.45	41.89	26.8	8.25	1.66	26.8	21.27	56.21
27.7	58.41	46.49	27.7	60.45	19.64	27.7	34.69	42.07	27.8	8.42	1.58	27.8	21.44	56.21
28.7	58.56	46.76	28.7	60.96	19.73	28.7	34.92	42.25	28.8	8.59	1.51	28.8	21.59	56.22
29.7	58.71	47.03	29.7	61.47	19.85	29.7	35.13	42.42	29.8	8.77	1.45	29.8	21.75	56.21
30.6	58.86	47.27	30.7	61.98	19.98	30.7	35.35	42.57	30.8	8.94	1.42	30.8	21.89	56.20
31.6	59.03	47.49	31.7	62.46	20.15	31.7	35.57	42.72	31.8	9.11	1.42	31.8	22.04	56.17

δ Octantis		Groombridge 2283		ρ Octantis		ε Ursæ Minoris		59 G. Apodis	
8.57	−8.51	23.28	+23.26	9.89	−9.84	7.34	+7.27	6.24	−6.16
$14^h\ 13^m\ 46^s.350$		$15^h\ 3^m\ 2^s.510$		$15^h\ 24^m\ 23^s.351$		$16^h\ 54^m\ 12^s.991$		$17^h\ 16^m\ 17^s.234$	
−83° 17′ 54″.52		+87° 32′ 42″.66		−84° 11′ 55″.43		+82° 10′ 21″.42		−80° 47′ 14″.27	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Feb.	17 57	+86 36	Feb.	18 7	−87 39	Feb.	18 58	+89 1	Feb.	19 29	−89 12	Feb.	20 48	+82 13
	s	″		s	″		s	″		s	″		s	″
0.9	56.58	41.18	0.9	13.29	35.73	0.9	36.31	9.81	0.9	53.62	61.47	1.0	21.61	65.23
1.9	56.81	40.89	1.9	13.75	35.51	1.9	36.80	9.48	1.9	54.54	61.16	2.0	21.59	64.86
2.9	57.08	40.61	2.9	14.18	35.29	2.9	37.37	9.15	2.9	55.39	60.86	2.9	21.58	64.50
3.9	57.35	40.36	3.9	14.61	35.06	3.9	38.00	8.85	3.9	56.19	60.55	3.9	21.58	64.16
4.9	57.62	40.12	4.9	15.06	34.82	4.9	38.67	8.56	4.9	56.99	60.23	4.9	21.59	63.83
5.9	57.87	39.91	5.9	15.52	34.57	5.9	39.34	8.31	5.9	57.84	59.89	5.9	21.63	63.51
6.9	58.12	39.71	6.9	16.03	34.31	6.9	39.97	8.07	6.9	58.79	59.54	6.9	21.66	63.21
7.9	58.37	39.52	7.9	16.59	34.06	7.9	40.55	7.83	7.9	59.86	59.19	7.9	21.67	62.92
8.9	58.60	39.33	8.9	17.18	33.81	8.9	41.07	7.60	8.9	61.07	58.84	8.9	21.68	62.64
9.9	58.83	39.11	9.9	17.78	33.61	9.9	41.57	7.34	9.9	62.37	58.52	9.9	21.70	62.36
10.9	59.06	38.88	10.9	18.39	33.41	10.9	42.07	7.06	10.9	63.73	58.21	10.9	21.71	62.04
11.9	59.30	38.64	11.9	18.99	33.24	11.9	42.61	6.76	11.9	65.09	57.92	11.9	21.71	61.71
12.9	59.57	38.39	12.9	19.56	33.08	12.9	43.23	6.46	12.9	66.40	57.63	12.9	21.72	61.37
13.9	59.85	38.14	13.9	20.10	32.93	13.9	43.95	6.17	13.9	67.64	57.37	13.9	21.74	61.01
14.8	60.17	37.91	14.9	20.62	32.78	14.9	44.75	5.87	14.9	68.81	57.11	14.9	21.77	60.64
15.8	60.49	37.70	15.9	21.13	32.62	15.9	45.63	5.58	15.9	69.92	56.84	15.9	21.81	60.30
16.8	60.83	37.50	16.8	21.63	32.45	16.9	46.56	5.33	16.9	71.01	56.57	16.9	21.86	59.96
17.8	61.16	37.33	17.8	22.14	32.27	17.9	47.49	5.08	17.9	72.11	56.30	17.9	21.91	59.62
18.8	61.50	37.18	18.8	22.66	32.08	18.9	48.44	4.87	18.9	73.23	56.01	18.9	21.97	59.30
19.8	61.83	37.03	19.8	23.21	31.89	19.9	49.39	4.67	19.9	74.42	55.70	19.9	22.03	59.01
20.8	62.15	36.89	20.8	23.78	31.70	20.9	50.29	4.46	20.9	75.67	55.39	20.9	22.09	58.72
21.8	62.46	36.76	21.8	24.37	31.51	21.9	51.19	4.26	21.9	77.01	55.10	21.9	22.16	58.43
22.8	62.78	36.63	22.8	24.99	31.34	22.9	52.05	4.06	22.9	78.43	54.81	22.9	22.21	58.15
23.8	63.09	36.48	23.8	25.64	31.19	23.9	52.89	3.86	23.9	79.94	54.54	23.9	22.27	57.88
24.8	63.38	36.32	24.8	26.29	31.05	24.9	53.71	3.64	24.9	81.50	54.27	24.9	22.33	57.60
25.8	63.68	36.17	25.8	26.94	30.94	25.9	54.54	3.44	25.9	83.10	54.03	25.9	22.39	57.29
26.8	63.99	36.01	26.8	27.58	30.84	26.9	55.40	3.21	26.9	84.70	53.79	26.9	22.44	56.98
27.8	64.32	35.86	27.8	28.21	30.74	27.9	56.31	2.98	27.9	86.27	53.56	27.9	22.49	56.66
28.8	64.66	35.70	28.8	28.81	30.66	28.9	57.30	2.75	28.9	87.79	53.37	28.9	22.55	56.34
29.8	65.03	35.55	29.8	29.37	30.57	29.8	58.36	2.53	29.9	89.23	53.17	29.9	22.64	56.01
30.8	65.41	35.44	30.8	29.94	30.47	30.8	59.50	2.33	30.9	90.60	52.94	30.9	22.72	55.69
31.8	65.78	35.34	31.8	30.50	30.34	31.8	60.67	2.15	31.9	91.96	52.71	31.9	22.81	55.40
16.91	+16.88		24.48	−24.46		58.36	+58.35		73.06	−73.06		7.40	+7.33	
17^{h} 58^{m} $22^{s}.311$			18^{h} 7^{m} $23^{s}.343$			19^{h} 0^{m} $15^{s}.079$			19^{h} 30^{m} $50^{s}.769$			20^{h} 48^{m} $32^{s}.146$		
+86° 36′ 51″.04			−87° 39′ 50″.89			+89° 1′ 12″.80			−89° 13′ 13″.35			+82° 13′ 56″.82		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Feb.	21 38	−83 5	Feb.	22 16	−86 22	Feb.	22 37	−81 48	Feb.	23 27	+86 51	Feb.	23 47	−82 28
	s	″		s	″		s	″		s	″		s	″
1.0	30.75	31.16	1.1	16.74	50.20	1.1	45.06	25.99	1.1	29.41	60.79	1.1	16.87	14.56
2.0	30.76	30.83	2.1	16.68	49.86	2.1	45.03	25.68	2.1	29.11	60.55	2.1	16.78	14.28
3.0	30.75	30.49	3.1	16.60	49.53	3.1	44.98	25.36	3.1	28.83	60.28	3.1	16.69	14.01
4.0	30.75	30.16	4.1	16.52	49.20	4.1	44.93	25.04	4.1	28.58	60.00	4.1	16.58	13.75
5.0	30.74	29.79	5.1	16.42	48.83	5.1	44.87	24.71	5.1	28.35	59.73	5.1	16.47	13.47
6.0	30.72	29.43	6.1	16.31	48.47	6.1	44.82	24.35	6.1	28.16	59.47	6.1	16.35	13.16
7.0	30.71	29.03	7.0	16.22	48.07	7.1	44.77	23.98	7.1	27.97	59.23	7.1	16.24	12.83
8.0	30.72	28.62	8.0	16.16	47.66	8.1	44.73	23.61	8.1	27.79	59.00	8.1	16.13	12.49
9.0	30.76	28.20	9.0	16.11	47.24	9.1	44.70	23.19	9.1	27.59	58.79	9.1	16.03	12.14
10.0	30.79	27.79	10.0	16.11	46.81	10.1	44.69	22.77	10.1	27.37	58.57	10.1	15.96	11.77
11.0	30.83	27.40	11.0	16.14	46.41	11.1	44.68	22.40	11.1	27.13	58.33	11.1	15.90	11.40
12.0	30.89	27.02	12.0	16.17	46.03	12.0	44.68	22.02	12.1	26.88	58.08	12.1	15.84	11.04
13.0	30.95	26.68	13.0	16.20	45.67	13.0	44.68	21.68	13.1	26.63	57.81	13.1	15.79	10.71
14.0	31.00	26.34	14.0	16.21	45.31	14.0	44.68	21.34	14.1	26.39	57.52	14.1	15.73	10.39
14.9	31.03	25.99	15.0	16.22	44.97	15.0	44.67	21.00	15.1	26.16	57.20	15.1	15.67	10.07
15.9	31.07	25.66	16.0	16.22	44.63	16.0	44.66	20.64	16.1	25.97	56.87	16.1	15.59	9.77
16.9	31.10	25.32	17.0	16.21	44.27	17.0	44.63	20.31	17.1	25.80	56.56	17.1	15.51	9.46
17.9	31.12	24.96	18.0	16.19	43.92	18.0	44.60	19.97	18.1	25.66	56.24	18.1	15.43	9.14
18.9	31.14	24.60	19.0	16.17	43.54	19.0	44.58	19.61	19.1	25.53	55.93	19.1	15.35	8.82
19.9	31.17	24.24	20.0	16.16	43.15	20.0	44.57	19.23	20.1	25.41	55.63	20.1	15.27	8.49
20.9	31.21	23.85	21.0	16.15	42.75	21.0	44.56	18.85	21.1	25.31	55.33	21.1	15.20	8.13
21.9	31.25	23.47	22.0	16.16	42.34	22.0	44.55	18.46	22.1	25.21	55.05	22.1	15.12	7.77
22.9	31.31	23.09	23.0	16.20	41.92	23.0	44.54	18.05	23.1	25.11	54.77	23.1	15.07	7.39
23.9	31.39	22.71	24.0	16.25	41.52	24.0	44.56	17.66	24.1	24.98	54.50	24.1	15.02	6.98
24.9	31.47	22.33	24.9	16.33	41.12	25.0	44.58	17.27	25.0	24.85	54.23	25.1	14.98	6.58
25.9	31.56	21.95	25.9	16.43	40.73	26.0	44.61	16.87	26.0	24.72	53.96	26.1	14.95	6.20
26.9	31.66	21.57	26.9	16.53	40.34	27.0	44.65	16.48	27.0	24.58	53.65	27.1	14.94	5.82
27.9	31.75	21.23	27.9	16.65	39.96	28.0	44.69	16.11	28.0	24.43	53.35	28.1	14.92	5.45
28.9	31.84	20.89	28.9	16.76	39.60	29.0	44.72	15.75	29.0	24.29	53.03	29.1	14.89	5.09
29.9	31.93	20.56	29.9	16.85	39.26	30.0	44.75	15.39	30.0	24.19	52.68	30.0	14.86	4.73
30.9	31.99	20.23	30.9	16.91	38.91	30.9	44.76	15.05	31.0	24.12	52.33	31.0	14.81	4.40
31.9	32.05	19.89	31.9	16.97	38.56	31.9	44.77	14.69	32.0	24.08	51.98	32.0	14.77	4.05
	8.31	−8.25		15.83	−15.80		7.02	−6.94		18.29	+18.26		7.63	−7.56
21h 38m 38s.548			22h 16m 33s.212			22h 37m 51s.624			23h 27m 43s.571			23h 47m 23s.637		
−83° 5′ 34″.33			−86° 22′ 50″.92			−81° 48′ 24″.80			+86° 51′ 38″.62			−82° 28′ 8″.42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursae Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Mar.	0 57	+85 49	Mar.	1 30	+88 52	Mar.	1 41	−85 10	Mar.	4 10	+85 20	Mar.	5 35	+85 9
	s	″		s	″		s	″		s	″		s	″
0.1	17.09	44.04	0.1	50.05	42.08	0.1	40.83	52.05	0.2	46.46	49.22	0.3	64.25	50.25
1.1	16.88	43.78	1.1	49.16	41.85	1.1	40.65	51.76	1.2	46.17	49.22	1.3	63.98	50.36
2.1	16.69	43.50	2.1	48.31	41.61	2.1	40.47	51.47	2.2	45.89	49.18	2.3	63.72	50.45
3.1	16.51	43.18	3.1	47.53	41.34	3.1	40.30	51.19	3.2	45.60	49.13	3.3	63.45	50.50
4.1	16.36	42.89	4.1	46.84	41.06	4.1	40.10	50.94	4.2	45.33	49.05	4.3	63.18	50.55
5.1	16.24	42.59	5.1	46.23	40.79	5.1	39.88	50.67	5.2	45.08	48.95	5.3	62.93	50.57
6.1	16.14	42.30	6.1	45.69	40.52	6.1	39.66	50.39	6.2	44.84	48.85	6.3	62.69	50.57
7.1	16.05	42.03	7.1	45.19	40.28	7.1	39.46	50.08	7.2	44.62	48.75	7.3	62.47	50.57
8.1	15.96	41.76	8.1	44.69	40.05	8.1	39.25	49.76	8.2	44.42	48.68	8.3	62.27	50.61
9.1	15.86	41.51	9.1	44.17	39.83	9.1	39.06	49.42	9.2	44.22	48.61	9.3	62.07	50.63
10.1	15.74	41.26	10.1	43.59	39.61	10.1	38.89	49.05	10.2	43.99	48.54	10.3	61.84	50.68
11.1	15.61	41.00	11.1	42.95	39.37	11.1	38.74	48.68	11.2	43.76	48.48	11.3	61.62	50.73
12.1	15.47	40.73	12.1	42.28	39.13	12.1	38.60	48.33	12.2	43.52	48.42	12.3	61.38	50.80
13.1	15.32	40.45	13.1	41.60	38.87	13.1	38.47	47.99	13.2	43.25	48.34	13.3	61.11	50.85
14.1	15.18	40.14	14.1	40.93	38.58	14.1	38.34	47.67	14.2	42.98	48.25	14.3	60.86	50.87
15.1	15.05	39.82	15.1	40.31	38.27	15.1	38.20	47.36	15.2	42.70	48.14	15.3	60.58	50.86
16.1	14.95	39.47	16.1	39.76	37.96	16.1	38.06	47.07	16.2	42.43	47.99	16.3	60.29	50.87
17.1	14.87	39.13	17.1	39.27	37.64	17.1	37.91	46.76	17.2	42.18	47.82	17.2	60.02	50.84
18.1	14.81	38.79	18.1	38.85	37.30	18.1	37.76	46.45	18.2	41.93	47.65	18.2	59.75	50.79
19.1	14.74	38.46	19.1	38.48	36.97	19.1	37.60	46.14	19.2	41.70	47.48	19.2	59.50	50.73
20.0	14.70	38.13	20.1	38.16	36.66	20.1	37.44	45.82	20.2	41.48	47.30	20.2	59.25	50.67
21.0	14.67	37.83	21.1	37.87	36.36	21.1	37.28	45.48	21.2	41.26	47.13	21.2	59.00	50.61
22.0	14.63	37.52	22.1	37.58	36.07	22.1	37.13	45.12	22.2	41.07	46.96	22.2	58.78	50.55
23.0	14.60	37.23	23.1	37.27	35.80	23.1	36.98	44.75	23.2	40.88	46.81	23.2	58.56	50.49
24.0	14.56	36.94	24.1	36.98	35.53	24.1	36.85	44.38	24.2	40.68	46.66	24.2	58.34	50.44
25.0	14.53	36.67	25.1	36.67	35.25	25.1	36.75	43.99	25.2	40.49	46.51	25.2	58.12	50.39
26.0	14.48	36.39	26.1	36.30	34.97	26.1	36.65	43.61	26.2	40.26	46.37	26.2	57.90	50.35
27.0	14.41	36.08	27.1	35.92	34.68	27.1	36.56	43.24	27.2	40.05	46.22	27.2	57.66	50.32
28.0	14.35	35.76	28.0	35.53	34.37	28.1	36.48	42.87	28.2	39.83	46.07	28.2	57.41	50.27
29.0	14.30	35.43	29.0	35.19	34.05	29.1	36.41	42.52	29.2	39.59	45.89	29.2	57.14	50.22
30.0	14.26	35.09	30.0	34.89	33.72	30.1	36.32	42.18	30.2	39.36	45.67	30.2	56.88	50.13
31.0	14.25	34.75	31.0	34.67	33.38	31.0	36.22	41.84	31.2	39.15	45.45	31.2	56.63	50.01
13.74 +13.71			51.04 +51.03			11.90 −11.86			12.33 +12.29			11.86 +11.82		
0h 57m 24s.633			1h 31m 11s.709			1h 41m 54s.846			4h 10m 37s.831			5h 35m 50s.330		
+85° 49′ 24″.14			+88° 52′ 20″.55			−85° 10′ 45″.22			+85° 20′ 28″.88			+85° 9′ 34″.51		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Mar.	5 45	−84 50	Mar.	6 46	−80 44	Mar.	7 3	+87 10	Mar.	7 14	+82 34	Mar.	7 15	−86 54
	s	″		s	″		s	″		s	″		s	″
0.3	49.91	5.08	0.3	50.79	7.74	0.4	31.86	52.93	0.4	20.31	24.65	0.4	46.06	40.41
1.3	49.64	5.13	1.3	50.65	7.90	1.4	31.50	53.15	1.4	20.18	24.90	1.4	45.67	40.59
2.3	49.37	5.22	2.3	50.52	8.05	2.3	31.13	53.36	2.4	20.04	25.11	2.4	45.29	40.78
3.3	49.13	5.30	3.3	50.39	8.23	3.3	30.73	53.55	3.4	19.89	25.31	3.4	44.93	41.00
4.3	48.86	5.39	4.3	50.26	8.41	4.3	30.32	53.71	4.4	19.75	25.49	4.4	44.56	41.23
5.3	48.59	5.49	5.3	50.12	8.61	5.3	29.93	53.85	5.3	19.60	25.64	5.4	44.19	41.46
6.3	48.31	5.60	6.3	49.99	8.82	6.3	29.55	53.96	6.3	19.46	25.76	6.3	43.79	41.71
7.3	48.02	5.70	7.3	49.85	9.02	7.3	29.21	54.07	7.3	19.34	25.89	7.3	43.38	41.96
8.3	47.71	5.77	8.3	49.70	9.21	8.3	28.88	54.20	8.3	19.23	26.00	8.3	42.93	42.21
9.3	47.40	5.82	9.3	49.54	9.36	9.3	28.56	54.34	9.3	19.12	26.15	9.3	42.47	42.41
10.3	47.10	5.84	10.3	49.39	9.49	10.3	28.24	54.49	10.3	19.01	26.33	10.3	42.01	42.59
11.3	46.81	5.83	11.3	49.23	9.60	11.3	27.92	54.64	11.3	18.88	26.50	11.3	41.55	42.74
12.3	46.52	5.82	12.3	49.08	9.71	12.3	27.55	54.82	12.3	18.75	26.67	12.3	41.10	42.89
13.3	46.24	5.81	13.3	48.93	9.80	13.3	27.17	54.99	13.3	18.62	26.85	13.3	40.67	43.02
14.3	45.97	5.80	14.3	48.79	9.88	14.3	26.75	55.14	14.3	18.47	27.03	14.3	40.25	43.15
15.3	45.71	5.81	15.3	48.64	9.98	15.3	26.29	55.29	15.3	18.29	27.18	15.3	39.84	43.28
16.3	45.45	5.82	16.3	48.50	10.08	16.3	25.84	55.40	16.3	18.13	27.30	16.3	39.44	43.43
17.3	45.18	5.83	17.3	48.36	10.19	17.3	25.39	55.49	17.3	17.95	27.40	17.3	39.04	43.61
18.3	44.91	5.85	18.3	48.22	10.32	18.3	24.94	55.58	18.3	17.78	27.50	18.3	38.64	43.76
19.2	44.64	5.87	19.3	48.08	10.43	19.3	24.50	55.64	19.3	17.63	27.58	19.3	38.23	43.92
20.2	44.35	5.89	20.3	47.93	10.55	20.3	24.07	55.70	20.3	17.47	27.64	20.3	37.81	44.08
21.2	44.07	5.91	21.3	47.78	10.68	21.3	23.66	55.75	21.3	17.32	27.71	21.3	37.35	44.26
22.2	43.78	5.93	22.3	47.63	10.78	22.3	23.27	55.80	22.3	17.17	27.77	22.3	36.90	44.41
23.2	43.49	5.91	23.3	47.48	10.87	23.3	22.88	55.85	23.3	17.03	27.85	23.3	36.43	44.55
24.2	43.19	5.87	24.3	47.30	10.93	24.3	22.50	55.92	24.3	16.90	27.93	24.3	35.95	44.67
25.2	42.90	5.82	25.3	47.15	10.99	25.3	22.12	55.99	25.3	16.76	28.02	25.3	35.46	44.77
26.2	42.61	5.74	26.3	46.99	11.03	26.3	21.74	56.07	26.3	16.62	28.11	26.3	34.98	44.86
27.2	42.32	5.65	27.3	46.84	11.04	27.3	21.34	56.15	27.3	16.48	28.21	27.3	34.50	44.93
28.2	42.05	5.57	28.3	46.67	11.06	28.3	20.92	56.22	28.3	16.31	28.30	28.3	34.04	44.99
29.2	41.79	5.49	29.3	46.53	11.07	29.3	20.46	56.28	29.3	16.14	28.39	29.3	33.60	45.04
30.2	41.53	5.42	30.3	46.39	11.11	30.3	19.99	56.33	30.3	15.97	28.44	30.3	33.17	45.12
31.2	41.27	5.37	31.3	46.24	11.14	31.3	19.51	56.33	31.3	15.79	28.48	31.3	32.74	45.21
11.11		−11.06	6.21		−6.13	20.34		+20.32	7.74		+7.67	18.56		−18.54
5^h	45^m	$51^s.396$	6^h	46^m	$48^s.653$	7^h	3^m	$2^s.335$	7^h	14^m	$7^s.912$	7^h	15^m	$39^s.691$
−84°	49′	44″.27	−80°	43′	46″.14	+87°	10′	43″.86	+82°	34′	17″.32	−86°	54′	19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. *seq.* Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Mar.	11 0	−84 9	Mar.	12 14	+88 8	Mar.	12 46	−84 41	Mar.	12 48	+83 50	Mar.	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
0.5	8.53	38.27	0.6	58.82	37.80	0.6	35.51	1.14	0.6	39.61	50.58	0.6	51.02	15.31
1.5	8.52	38.64	1.6	59.17	38.11	1.6	35.61	1.48	1.6	39.74	50.86	1.6	51.19	15.62
2.5	8.52	39.00	2.6	59.48	38.43	2.6	35.74	1.81	2.6	39.85	51.14	2.6	51.37	15.92
3.5	8.52	39.36	3.6	59.72	38.76	3.6	35.86	2.14	3.6	39.96	51.45	3.6	51.56	16.21
4.5	8.53	39.72	4.6	59.92	39.09	4.6	35.99	2.46	4.6	40.06	51.75	4.6	51.75	16.49
5.5	8.55	40.12	5.6	60.07	39.40	5.6	36.13	2.80	5.6	40.12	52.04	5.6	51.97	16.78
6.5	8.57	40.53	6.6	60.21	39.69	6.6	36.28	3.16	6.6	40.20	52.32	6.6	52.20	17.10
7.5	8.59	40.95	7.6	60.34	39.97	7.6	36.44	3.53	7.6	40.28	52.59	7.6	52.42	17.43
8.5	8.59	41.39	8.5	60.50	40.24	8.6	36.58	3.92	8.6	40.36	52.84	8.6	52.62	17.79
9.5	8.58	41.82	9.5	60.68	40.50	9.6	36.69	4.33	9.6	40.45	53.08	9.6	52.82	18.16
10.5	8.54	42.25	10.5	60.89	40.77	10.6	36.80	4.74	10.6	40.54	53.33	10.6	53.00	18.52
11.5	8.50	42.64	11.5	61.12	41.06	11.6	36.89	5.13	11.6	40.64	53.60	11.6	53.14	18.89
12.5	8.44	43.03	12.5	61.35	41.37	12.6	36.95	5.52	12.6	40.74	53.87	12.6	53.29	19.26
13.5	8.38	43.39	13.5	61.56	41.69	13.6	37.02	5.89	13.6	40.83	54.18	13.6	53.41	19.60
14.5	8.34	43.75	14.5	61.73	42.02	14.6	37.08	6.23	14.6	40.92	54.50	14.6	53.54	19.93
15.5	8.29	44.09	15.5	61.87	42.36	15.6	37.16	6.58	15.6	40.99	54.83	15.6	53.66	20.24
16.5	8.25	44.44	16.5	61.96	42.73	16.5	37.24	6.91	16.6	41.05	55.16	16.6	53.80	20.56
17.5	8.22	44.80	17.5	62.00	43.07	17.5	37.32	7.25	17.5	41.10	55.50	17.6	53.94	20.87
18.5	8.19	45.16	18.5	62.02	43.42	18.5	37.41	7.60	18.5	41.13	55.84	18.6	54.09	21.20
19.5	8.16	45.54	19.5	62.02	43.75	19.5	37.50	7.96	19.5	41.16	56.17	19.6	54.25	21.53
20.5	8.13	45.92	20.5	61.99	44.08	20.5	37.59	8.32	20.5	41.19	56.49	20.6	54.40	21.87
21.5	8.09	46.32	21.5	61.96	44.39	21.5	37.69	8.70	21.5	41.22	56.79	21.6	54.56	22.23
22.5	8.04	46.73	22.5	61.95	44.68	22.5	37.78	9.11	22.5	41.25	57.08	22.6	54.71	22.60
23.5	7.99	47.13	23.5	61.95	44.98	23.5	37.84	9.51	23.5	41.28	57.37	23.6	54.86	22.98
24.5	7.92	47.51	24.5	61.95	45.27	24.5	37.90	9.92	24.5	41.32	57.67	24.6	54.97	23.37
25.5	7.83	47.89	25.5	61.98	45.57	25.5	37.94	10.32	25.5	41.35	57.96	25.6	55.08	23.76
26.4	7.74	48.26	26.5	62.02	45.88	26.5	37.98	10.71	26.5	41.40	58.24	26.6	55.17	24.15
27.4	7.65	48.61	27.5	62.06	46.19	27.5	37.98	11.10	27.5	41.44	58.56	27.5	55.26	24.53
28.4	7.55	48.95	28.5	62.07	46.52	28.5	38.00	11.47	28.5	41.47	58.89	28.5	55.32	24.89
29.4	7.46	49.28	29.5	62.04	46.86	29.5	38.02	11.84	29.5	41.48	59.23	29.5	55.40	25.24
30.4	7.37	49.61	30.5	61.97	47.20	30.5	38.03	12.17	30.5	41.50	59.57	30.5	55.48	25.58
31.4	7.31	49.94	31.5	61.84	47.54	31.5	38.07	12.51	31.5	41.50	59.92	31.5	55.57	25.91
	9.83	−9.78		30.89	+30.88		10.80	−10.75		9.33	+9.28		12.39	−12.35
10h	59m	54s.546	12h	14m	29s.190	12h	46m	19s.119	12h	48m	31s.308	13h	27m	32s.891
−84°	9′	29″.38	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Mar.	14 13	−83 17	Mar.	15 3	+87 32	Mar.	15 24	−84 11	Mar.	16 54	+82 10	Mar.	17 16	−80 46
	s	″		s	″		s	″		s	″		s	″
$0^{d}.7$	58.56	46.76	0.7	0.96	19.73	0.7	34.92	42.25	0.8	8.59	1.51	0.8	21.59	56.22
1.7	58.71	47.03	1.7	1.47	19.85	1.7	35.13	42.42	1.8	8.77	1.45	1.8	21.75	56.21
2.6	58.86	47.27	2.7	1.98	19.98	2.7	35.35	42.57	2.8	8.94	1.42	2.8	21.89	56.20
3.6	59.03	47.49	3.7	2.46	20.15	3.7	35.57	42.72	3.8	9.11	1.42	3.8	22.04	56.17
4.6	59.20	47.72	4.7	2.90	20.33	4.7	35.80	42.85	4.8	9.28	1.45	4.8	22.21	56.13
5.6	59.38	47.97	5.7	3.31	20.52	5.7	36.05	42.98	5.8	9.43	1.48	5.8	22.38	56.10
6.6	59.56	48.23	6.7	3.69	20.70	6.7	36.32	43.13	6.7	9.58	1.52	6.8	22.56	56.05
7.6	59.76	48.51	7.7	4.06	20.88	7.7	36.58	43.30	7.7	9.73	1.56	7.8	22.75	56.03
8.6	59.95	48.81	8.7	4.43	21.02	8.7	36.84	43.49	8.7	9.88	1.57	8.8	22.93	56.02
9.6	60.13	49.13	9.7	4.82	21.16	9.7	37.09	43.72	9.7	10.03	1.58	9.8	23.12	56.05
10.6	60.29	49.46	10.7	5.23	21.29	10.7	37.34	43.96	10.7	10.18	1.57	10.8	23.31	56.08
11.6	60.43	49.80	11.7	5.65	21.43	11.7	37.57	44.20	11.7	10.33	1.56	11.7	23.49	56.14
12.6	60.56	50.13	12.7	6.11	21.59	12.7	37.78	44.44	12.7	10.51	1.56	12.7	23.65	56.21
13.6	60.69	50.43	13.7	6.57	21.77	13.7	37.98	44.67	13.7	10.68	1.56	13.7	23.80	56.28
14.6	60.82	50.72	14.6	7.02	21.96	14.7	38.17	44.88	14.7	10.85	1.61	14.7	23.95	56.32
15.6	60.95	51.01	15.6	7.45	22.18	15.7	38.36	45.07	15.7	11.02	1.67	15.7	24.10	56.37
16.6	61.07	51.28	16.6	7.87	22.42	16.7	38.55	45.27	16.7	11.19	1.76	16.7	24.24	56.40
17.6	61.20	51.55	17.6	8.25	22.66	17.7	38.75	45.45	17.7	11.34	1.86	17.7	24.39	56.42
18.6	61.34	51.82	18.6	8.62	22.91	18.7	38.97	45.65	18.7	11.50	1.99	18.7	24.55	56.43
19.6	61.49	52.11	19.6	8.95	23.15	19.7	39.20	45.85	19.7	11.66	2.11	19.7	24.72	56.46
20.6	61.64	52.42	20.6	9.28	23.40	20.6	39.42	46.06	20.7	11.81	2.23	20.7	24.89	56.49
21.6	61.78	52.73	21.6	9.59	23.65	21.6	39.64	46.29	21.7	11.97	2.36	21.7	25.06	56.53
22.6	61.93	53.05	22.6	9.90	23.88	22.6	39.87	46.52	22.7	12.11	2.46	22.7	25.23	56.60
23.6	62.07	53.39	23.6	10.21	24.11	23.6	40.09	46.78	23.7	12.25	2.56	23.7	25.41	56.68
24.6	62.20	53.74	24.6	10.52	24.31	24.6	40.31	47.05	24.7	12.39	2.66	24.7	25.59	56.78
25.6	62.33	54.10	25.6	10.84	24.52	25.6	40.51	47.34	25.7	12.53	2.75	25.7	25.76	56.90
26.6	62.43	54.46	26.6	11.18	24.74	26.6	40.70	47.63	26.7	12.68	2.85	26.7	25.93	57.03
27.6	62.53	54.80	27.6	11.53	24.98	27.6	40.88	47.91	27.7	12.84	2.95	27.7	26.08	57.16
28.6	62.62	55.14	28.6	11.88	25.22	28.6	41.05	48.19	28.7	12.99	3.07	28.7	26.23	57.29
29.6	62.71	55.45	29.6	12.22	25.48	29.6	41.21	48.46	29.7	13.15	3.20	29.7	26.38	57.39
30.6	62.80	55.76	30.6	12.54	25.76	30.6	41.38	48.71	30.7	13.30	3.37	30.7	26.52	57.49
31.6	62.90	56.06	31.6	12.82	26.08	31.6	41.55	48.95	31.7	13.45	3.55	31.7	26.66	57.58
8.57		−8.51	23.29		+23.27	9.89		−9.84	7.34		+7.27	6.24		−6.16
14^{h}	13^{m}	$46^{s}.350$	15^{h}	3^{m}	$2^{s}.510$	15^{h}	24^{m}	$23^{s}.351$	16^{h}	54^{m}	$12^{s}.991$	17^{h}	16^{m}	$17^{s}.234$
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.27

CIRCUMPOLAR STARS,

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Mar.	17 58	+86 36	Mar.	18 7	−87 39	Mar.	18 58	+89 0	Mar.	19 30	−89 12	Mar.	20 48	+82 13
	s	″		s	″		s	″		s	″		s	″
0.8	4.66	35.70	0.8	28.81	30.66	0.9	57.30	62.75	0.9	27.79	53.37	0.9	22.55	56.34
1.8	5.03	35.55	1.8	29.37	30.57	1.8	58.36	62.53	1.9	29.23	53.17	1.9	22.64	56.01
2.8	5.41	35.44	2.8	29.94	30.47	2.8	59.50	62.33	2.9	30.60	52.94	2.9	22.72	55.69
3.8	5.78	35.34	3.8	30.50	30.34	3.8	60.67	62.15	3.9	31.96	52.71	3.9	22.81	55.40
4.8	6.16	35.27	4.8	31.08	30.22	4.8	61.84	62.01	4.9	33.34	52.46	4.9	22.92	55.13
5.8	6.52	35.21	5.8	31.68	30.08	5.8	62.97	61.88	5.9	34.77	52.20	5.9	23.03	54.89
6.8	6.86	35.18	6.8	32.32	29.95	6.8	64.05	61.77	6.9	36.32	51.95	6.9	23.13	54.66
7.8	7.19	35.15	7.8	33.00	29.85	7.8	65.07	61.66	7.9	37.98	51.70	7.9	23.22	54.45
8.8	7.50	35.09	8.8	33.70	29.75	8.8	66.04	61.53	8.9	39.75	51.45	8.9	23.31	54.22
9.8	7.82	35.02	9.8	34.41	29.68	9.8	67.01	61.40	9.8	41.57	51.24	9.9	23.40	53.99
10.8	8.14	34.94	10.8	35.11	29.63	10.8	67.97	61.25	10.8	43.40	51.04	10.9	23.49	53.75
11.8	8.48	34.85	11.8	35.77	29.59	11.8	68.99	61.07	11.8	45.19	50.86	11.9	23.57	53.48
12.8	8.85	34.76	12.8	36.41	29.56	12.8	70.10	60.91	12.8	46.90	50.71	12.9	23.66	53.21
13.8	9.23	34.70	13.8	37.02	29.54	13.8	71.28	60.76	13.8	48.55	50.55	13.9	23.76	52.93
14.8	9.62	34.64	14.8	37.59	29.51	14.8	72.53	60.61	14.8	50.12	50.40	14.9	23.87	52.66
15.8	10.02	34.60	15.8	38.16	29.47	15.8	73.83	60.49	15.8	51.64	50.22	15.9	24.00	52.39
16.8	10.43	34.59	16.8	38.74	29.42	16.8	75.15	60.38	16.8	53.14	50.04	16.9	24.12	52.15
17.8	10.81	34.60	17.8	39.32	29.36	17.8	76.47	60.30	17.8	54.66	49.85	17.9	24.25	51.91
18.8	11.20	34.62	18.8	39.91	29.31	18.8	77.77	60.24	18.8	56.21	49.67	18.9	24.38	51.70
19.8	11.57	34.65	19.8	40.53	29.25	19.8	79.04	60.18	19.8	57.83	49.49	19.9	24.52	51.51
20.8	11.94	34.68	20.8	41.18	29.19	20.8	80.26	60.13	20.8	59.51	49.30	20.9	24.65	51.33
21.8	12.28	34.72	21.8	41.84	29.14	21.8	81.45	60.09	21.8	61.26	49.12	21.9	24.78	51.15
22.7	12.63	34.75	22.8	42.52	29.12	22.8	82.62	60.04	22.8	63.07	48.95	22.9	24.91	50.98
23.7	12.97	34.78	23.8	43.21	29.11	23.8	83.74	59.99	23.8	64.94	48.80	23.9	25.04	50.80
24.7	13.30	34.79	24.8	43.89	29.11	24.8	84.85	59.94	24.8	66.86	48.65	24.9	25.16	50.62
25.7	13.65	34.79	25.7	44.56	29.13	25.8	85.97	59.87	25.8	68.78	48.53	25.9	25.27	50.43
26.7	14.01	34.80	26.7	45.23	29.17	26.8	87.12	59.79	26.8	70.68	48.43	26.9	25.39	50.23
27.7	14.37	34.81	27.7	45.85	29.22	27.8	88.33	59.72	27.8	72.51	48.34	27.9	25.52	50.03
28.7	14.74	34.85	28.7	46.47	29.27	28.8	89.59	59.66	28.8	74.26	48.25	28.9	25.65	49.83
29.7	15.12	34.90	29.7	47.04	29.32	29.8	90.91	59.61	29.8	75.96	48.15	29.8	25.79	49.64
30.7	15.52	34.98	30.7	47.61	29.34	30.8	92.27	59.60	30.8	77.59	48.04	30.8	25.94	49.46
31.7	15.90	35.07	31.7	48.20	29.35	31.8	93.64	59.60	31.8	79.21	47.92	31.8	26.09	49.32
16.91		+16.88	24.47		−24.45	58.28		+58.27	72.89		−72.89	7.40		+7.33
17^h	58^m	$22^s.311$	18^h	7^m	$23^s.343$	19^h	0^m	$15^s.079$	19^h	30^m	$50^s.769$	20^h	48^m	$32^s.146$
+86°	36′	51″.04	−87°	39′	50″.89	+89°	1′	12″.80	−89°	13′	13″.35	+82°	13′	56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Mar.	21 38	−83 5	Mar.	22 16	−86 22	Mar.	22 37	−81 48	Mar.	23 27	+86 51	Mar.	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
0.9	31.84	20.89	0.9	16.76	39.60	1.0	44.72	15.75	1.0	24.29	53.03	1.1	14.89	65.09
1.9	31.93	20.56	1.9	16.85	39.26	2.0	44.75	15.39	2.0	24.19	52.68	2.0	14.86	64.73
2.9	31.99	20.23	2.9	16.91	38.91	2.9	44.76	15.05	3.0	24.12	52.33	3.0	14.81	64.40
3.9	32.05	19.89	3.9	16.97	38.56	3.9	44.77	14.69	4.0	24.08	51.98	4.0	14.77	64.05
4.9	32.11	19.53	4.9	17.03	38.19	4.9	44.78	14.34	5.0	24.07	51.65	5.0	14.72	63.69
5.9	32.19	19.16	5.9	17.08	37.79	5.9	44.79	13.95	6.0	24.07	51.33	6.0	14.67	63.31
6.9	32.26	18.77	6.9	17.15	37.38	6.9	44.80	13.54	7.0	24.08	51.04	7.0	14.63	62.91
7.9	32.35	18.38	7.9	17.25	36.96	7.9	44.84	13.13	8.0	24.08	50.76	8.0	14.59	62.50
8.9	32.46	18.00	8.9	17.39	36.54	8.9	44.88	12.69	9.0	24.07	50.49	9.0	14.58	62.08
9.9	32.59	17.62	9.9	17.54	36.16	9.9	44.94	12.28	10.0	24.03	50.21	10.0	14.57	61.65
10.9	32.72	17.25	10.9	17.71	35.78	10.9	45.00	11.90	11.0	23.99	49.92	11.0	14.58	61.23
11.9	32.85	16.92	11.9	17.89	35.41	11.9	45.07	11.52	12.0	23.94	49.60	12.0	14.59	60.85
12.9	32.98	16.60	12.9	18.06	35.05	12.9	45.13	11.15	13.0	23.89	49.27	13.0	14.60	60.46
13.9	33.09	16.30	13.9	18.23	34.72	13.9	45.19	10.81	14.0	23.87	48.94	14.0	14.60	60.10
14.9	33.20	16.01	14.9	18.37	34.39	14.9	45.24	10.48	14.9	23.87	48.57	15.0	14.61	59.74
15.9	33.30	15.72	15.9	18.50	34.07	15.9	45.29	10.15	15.9	23.90	48.21	16.0	14.61	59.41
16.9	33.39	15.41	16.9	18.63	33.74	16.9	45.33	9.81	16.9	23.94	47.86	17.0	14.60	59.05
17.9	33.48	15.09	17.9	18.75	33.40	17.9	45.37	9.45	17.9	24.01	47.52	18.0	14.58	58.69
18.9	33.58	14.77	18.9	18.87	33.04	18.9	45.41	9.09	18.9	24.10	47.19	19.0	14.57	58.32
19.9	33.68	14.44	19.9	19.01	32.68	19.9	45.45	8.72	19.9	24.20	46.87	19.9	14.56	57.96
20.9	33.81	14.10	20.9	19.16	32.32	20.9	45.51	8.35	20.9	24.31	46.57	20.9	14.56	57.58
21.9	33.93	13.76	21.9	19.33	31.95	21.9	45.56	7.97	21.9	24.41	46.28	21.9	14.56	57.16
22.9	34.06	13.41	22.9	19.51	31.57	22.9	45.64	7.59	22.9	24.50	45.99	22.9	14.57	56.75
23.9	34.20	13.08	23.9	19.70	31.19	23.9	45.72	7.20	23.9	24.60	45.69	23.9	14.61	56.34
24.9	34.36	12.76	24.9	19.93	30.82	24.9	45.80	6.82	24.9	24.67	45.40	24.9	14.64	55.92
25.9	34.53	12.45	25.9	20.17	30.47	25.9	45.90	6.45	25.9	24.73	45.11	25.9	14.68	55.52
26.9	34.67	12.16	26.9	20.42	30.13	26.9	45.99	6.11	26.9	24.80	44.80	26.9	14.73	55.12
27.9	34.83	11.87	27.9	20.66	29.82	27.9	46.09	5.78	27.9	24.88	44.48	27.9	14.78	54.75
28.9	34.97	11.60	28.9	20.89	29.52	28.9	46.18	5.45	28.9	24.96	44.17	28.9	14.82	54.39
29.9	35.11	11.34	29.9	21.09	29.23	29.9	46.27	5.13	29.9	25.08	43.84	29.9	14.85	54.04
30.9	35.24	11.07	30.9	21.29	28.93	30.9	46.34	4.81	30.9	25.22	43.52	30.9	14.87	53.70
31.9	35.37	10.79	31.9	21.47	28.61	31.9	46.41	4.49	31.9	25.41	43.20	31.9	14.90	53.35
8.31		−8.25	15.82		−15.79	7.01		−6.94	18.28		+18.25	7.63		−7.56
21^h	38^m	$38^s.548$	22^h	16^m	$33^s.212$	22^h	37^m	$51^s.624$	23^h	27^m	$43^s.571$	23^h	47^m	$23^s.637$
−83°	5′	34″.33	−86°	22′	50″.92	−81°	48′	24″.80	+86°	51′	38″.62	−82°	28′	8″.42

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Apr.	0 57	+85 49	Apr.	1 30	+88 52	Apr.	1 41	−85 10	Apr.	4 10	+85 20	Apr.	5 35	+85 9
	s	″		s	″		s	″		s	″		s	″
0.0	14.25	34.75	0.0	34.67	33.38	0.0	36.22	41.84	0.2	39.15	45.45	0.2	56.63	50.01
1.0	14.27	34.41	1.0	34.55	33.04	1.0	36.12	41.50	1.1	38.94	45.22	1.2	56.38	49.87
2.0	14.31	34.07	2.0	34.53	32.70	2.0	36.00	41.16	2.1	38.76	44.97	2.2	56.15	49.72
3.0	14.37	33.74	3.0	34.57	32.38	3.0	35.87	40.79	3.1	38.61	44.72	3.2	55.94	49.57
4.0	14.43	33.45	4.0	34.62	32.09	4.0	35.77	40.41	4.1	38.46	44.48	4.2	55.74	49.41
5.0	14.49	33.18	5.0	34.65	31.81	5.0	35.67	40.01	5.1	38.32	44.26	5.2	55.56	49.27
6.0	14.54	32.91	6.0	34.64	31.53	6.0	35.60	39.60	6.1	38.19	44.07	6.2	55.37	49.16
6.9	14.56	32.64	7.0	34.57	31.26	7.0	35.54	39.20	7.1	38.05	43.87	7.2	55.19	49.05
7.9	14.58	32.37	8.0	34.46	30.98	8.0	35.48	38.79	8.1	37.88	43.68	8.2	54.98	48.94
8.9	14.58	32.07	9.0	34.33	30.66	9.0	35.44	38.39	9.1	37.70	43.48	9.2	54.76	48.83
9.9	14.59	31.75	10.0	34.21	30.33	10.0	35.43	38.01	10.1	37.51	43.26	10.2	54.53	48.71
10.9	14.62	31.42	11.0	34.14	30.00	11.0	35.40	37.66	11.1	37.32	43.01	11.2	54.29	48.57
11.9	14.66	31.08	12.0	34.12	29.65	12.0	35.36	37.32	12.1	37.14	42.75	12.2	54.05	48.40
12.9	14.72	30.74	13.0	34.16	29.28	13.0	35.32	36.98	13.1	36.96	42.48	13.2	53.81	48.23
13.9	14.81	30.40	14.0	34.29	28.93	14.0	35.27	36.65	14.1	36.80	42.20	14.2	53.58	48.04
14.9	14.90	30.07	14.9	34.46	28.59	15.0	35.22	36.31	15.1	36.65	41.92	15.2	53.36	47.83
15.9	15.00	29.75	15.9	34.69	28.26	16.0	35.16	35.96	16.1	36.52	41.63	16.2	53.16	47.61
16.9	15.13	29.44	16.9	34.96	27.94	17.0	35.11	35.59	17.1	36.41	41.34	17.2	52.98	47.39
17.9	15.26	29.14	17.9	35.24	27.65	17.9	35.06	35.21	18.1	36.30	41.05	18.2	52.80	47.18
18.9	15.36	28.86	18.9	35.52	27.35	18.9	35.03	34.83	19.1	36.21	40.77	19.2	52.63	46.98
19.9	15.47	28.60	19.9	35.79	27.06	19.9	35.00	34.43	20.1	36.11	40.53	20.2	52.48	46.79
20.9	15.58	28.34	20.9	36.03	26.78	20.9	34.99	34.04	21.1	36.02	40.27	21.2	52.32	46.60
21.9	15.69	28.08	21.9	36.26	26.50	21.9	34.99	33.65	22.1	35.92	40.03	22.2	52.16	46.41
22.9	15.79	27.80	22.9	36.45	26.22	22.9	35.01	33.25	23.1	35.82	39.79	23.1	51.99	46.24
23.9	15.89	27.53	23.9	36.63	25.92	23.9	35.05	32.86	24.1	35.70	39.53	24.1	51.81	46.05
24.9	15.98	27.25	24.9	36.83	25.61	24.9	35.08	32.48	25.1	35.57	39.26	25.1	51.62	45.86
25.9	16.09	26.96	25.9	37.08	25.29	25.9	35.11	32.11	26.1	35.46	38.97	26.1	51.44	45.65
26.9	16.22	26.65	26.9	37.38	24.97	26.9	35.12	31.78	27.1	35.35	38.66	27.1	51.25	45.42
27.9	16.36	26.34	27.9	37.79	24.65	27.9	35.12	31.46	28.1	35.25	38.35	28.1	51.07	45.16
28.9	16.54	26.05	28.9	38.29	24.33	28.9	35.12	31.12	29.1	35.18	38.01	29.1	50.91	44.88
29.9	16.74	25.78	29.9	38.85	24.04	29.9	35.12	30.76	30.1	35.12	37.67	30.1	50.77	44.59
30.9	16.95	25.54	30.9	39.45	23.75	30.9	35.12	30.40	31.1	35.11	37.35	31.1	50.65	44.31
13.74 +13.70			50.91 +50.90			11.89 −11.85			12.32 +12.28			11.86 +11.82		
0^h 57^m $24^s.633$			1^h 31^m $11^s.709$			1^h 41^m $54^s.846$			4^h 10^m $37^s.831$			5^h 35^m $50^s.330$		
+85° 49′ 24″.14			+88° 52′ 20″.55			−85° 10′ 45″.22			+85° 20′ 28″.88			+85° 9′ 34″.51		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2.

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	5 45	−84 50
	s	″
0.2	41.27	5.37
1.2	41.01	5.33
2.2	40.74	5.30
3.2	40.46	5.27
4.2	40.17	5.21
5.2	39.87	5.13
6.2	39.58	5.03
7.2	39.29	4.90
8.2	39.02	4.76
9.2	38.77	4.60
10.2	38.52	4.46
11.2	38.27	4.33
12.2	38.03	4.21
13.2	37.80	4.09
14.2	37.56	3.96
15.2	37.32	3.86
16.2	37.07	3.75
17.2	36.82	3.62
18.2	36.55	3.50
19.2	36.30	3.37
20.2	36.05	3.19
21.2	35.79	3.01
22.2	35.54	2.82
23.2	35.29	2.61
24.2	35.07	2.40
25.1	34.84	2.19
26.1	34.64	1.99
27.1	34.44	1.80
28.1	34.21	1.64
29.1	34.00	1.49
30.1	33.78	1.33
31.1	33.54	1.16
	11.11	−11.06
	5^h 45^m $51^s.396$	
		−84° 49′ 44″.27

ζ Mensæ. Mag. 5.6.

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	6 46	−80 44
	s	″
0.3	46.24	11.14
1.3	46.09	11.19
2.3	45.95	11.25
3.3	45.80	11.32
4.2	45.63	11.38
5.2	45.46	11.40
6.2	45.31	11.41
7.2	45.15	11.39
8.2	44.99	11.35
9.2	44.84	11.29
10.2	44.69	11.24
11.2	44.55	11.19
12.2	44.41	11.14
13.2	44.27	11.12
14.2	44.13	11.09
15.2	43.98	11.08
16.2	43.84	11.05
17.2	43.69	11.02
18.2	43.55	10.98
19.2	43.40	10.94
20.2	43.25	10.87
21.2	43.09	10.78
22.2	42.95	10.69
23.2	42.80	10.58
24.2	42.66	10.45
25.2	42.52	10.32
26.2	42.38	10.20
27.2	42.25	10.10
28.2	42.12	10.01
29.2	41.99	9.93
30.2	41.86	9.86
31.2	41.72	9.77
	6.21	−6.13
	6^h 46^m $48^s.653$	
		−80° 43′ 46″.14

51 H. Cephei. Mag. 5.3.

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	7 3	+87 10
	s	″
0.3	19.51	56.33
1.3	19.05	56.33
2.3	18.60	56.30
3.3	18.18	56.26
4.3	17.80	56.21
5.3	17.42	56.16
6.3	17.06	56.15
7.3	16.69	56.14
8.2	16.32	56.14
9.2	15.90	56.15
10.2	15.47	56.15
11.2	15.01	56.14
12.2	14.54	56.10
13.2	14.06	56.04
14.2	13.60	55.96
15.2	13.15	55.87
16.2	12.72	55.76
17.2	12.30	55.65
18.2	11.91	55.54
19.2	11.53	55.43
20.2	11.17	55.32
21.2	10.81	55.22
22.2	10.46	55.13
23.2	10.10	55.05
24.2	9.72	54.96
25.2	9.32	54.88
26.2	8.90	54.76
27.2	8.47	54.63
28.2	8.04	54.47
29.2	7.65	54.29
30.2	7.28	54.10
31.2	6.95	53.89
	20.34	+20.32
	7^h 3^m $2^s.335$	
		+87° 10′ 43″.86

25 H. Camelop. Mag. 5.1.

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	7 14	+82 34
	s	″
0.3	15.79	28.48
1.3	15.61	28.48
2.3	15.45	28.47
3.3	15.30	28.43
4.3	15.15	28.40
5.3	15.01	28.39
6.3	14.90	28.38
7.3	14.76	28.38
8.3	14.61	28.41
9.3	14.46	28.44
10.3	14.30	28.45
11.2	14.12	28.45
12.2	13.95	28.44
13.2	13.77	28.40
14.2	13.58	28.35
15.2	13.41	28.27
16.2	13.25	28.18
17.2	13.10	28.09
18.2	12.95	27.99
19.2	12.81	27.90
20.2	12.67	27.81
21.2	12.54	27.72
22.2	12.41	27.67
23.2	12.27	27.62
24.2	12.13	27.55
25.2	11.99	27.47
26.2	11.82	27.39
27.2	11.65	27.27
28.2	11.50	27.13
29.2	11.34	26.96
30.2	11.20	26.78
31.2	11.08	26.59
	7.74	+7.67
	7^h 14^m $7^s.912$	
		+82° 34′ 17″.32

7 G. Octantis. Mag. 6.4.

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	7 15	−86 54
	s	″
0.3	32.74	45.21
1.3	32.31	45.31
2.3	31.88	45.43
3.3	31.42	45.54
4.3	30.94	45.64
5.3	30.44	45.74
6.3	29.93	45.80
7.3	29.42	45.84
8.3	28.94	45.84
9.3	28.46	45.83
10.3	28.01	45.84
11.2	27.58	45.84
12.2	27.15	45.83
13.2	26.73	45.84
14.2	26.31	45.88
15.2	25.89	45.91
16.2	25.46	45.95
17.2	25.00	45.98
18.2	24.55	46.00
19.2	24.08	46.01
20.2	23.60	46.00
21.2	23.12	45.97
22.2	22.64	45.92
23.2	22.16	45.86
24.2	21.71	45.77
25.2	21.28	45.69
26.2	20.85	45.63
27.2	20.45	45.57
28.2	20.04	45.54
29.2	19.64	45.51
30.2	19.22	45.49
31.2	18.77	45.46
	18.57	−18.54
	7^h 15^m $39^s.691$	
		−86° 54′ 19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	8 18	+88 52
	s	″
0.3	40.20	46.19
1.3	39.07	46.28
2.3	37.97	46.35
3.3	36.91	46.41
4.3	35.93	46.46
5.3	35.00	46.52
6.3	34.11	46.61
7.3	33.22	46.70
8.3	32.29	46.79
9.3	31.30	46.88
10.3	30.24	46.98
11.3	29.12	47.08
12.3	27.96	47.15
13.3	26.78	47.20
14.3	25.57	47.23
15.3	24.39	47.24
16.3	23.23	47.25
17.3	22.11	47.26
18.3	21.04	47.25
19.3	20.02	47.24
20.3	19.02	47.23
21.3	18.05	47.21
22.3	17.09	47.21
23.3	16.12	47.23
24.3	15.10	47.24
25.3	14.03	47.24
26.3	12.91	47.24
27.2	11.73	47.20
28.2	10.55	47.16
29.2	9.38	47.08
30.2	8.28	46.99
31.2	7.25	46.87

51.15 +51.14
8^h 17^m $47^s.546$
+88° 52′ 37″.80

ζ Octantis. Mag. 5.4

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	9 8	−85 20
	s	″
0.4	47.95	52.76
1.4	47.75	53.03
2.4	47.53	53.29
3.3	47.31	53.57
4.3	47.07	53.84
5.3	46.82	54.11
6.3	46.55	54.36
7.3	46.28	54.58
8.3	46.00	54.77
9.3	45.72	54.95
10.3	45.46	55.13
11.3	45.21	55.30
12.3	44.96	55.48
13.3	44.73	55.65
14.3	44.49	55.83
15.3	44.26	56.02
16.3	44.01	56.22
17.3	43.77	56.41
18.3	43.51	56.60
19.3	43.24	56.79
20.3	42.96	56.97
21.3	42.68	57.12
22.3	42.39	57.27
23.3	42.09	57.40
24.3	41.80	57.50
25.3	41.52	57.60
26.3	41.24	57.69
27.3	40.99	57.79
28.3	40.75	57.90
29.3	40.50	58.03
30.3	40.25	58.17
31.3	39.98	58.33

12.33 −12.29
9^h 8^m $41^s.594$
−85° 20′ 26″.78

1 H. Draconis. Mag. 4.6

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	9 25	+81 41
	s	″
0.4	48.70	12.66
1.4	48.57	12.85
2.4	48.44	13.01
3.4	48.32	13.15
4.4	48.21	13.29
5.4	48.10	13.43
6.4	48.00	13.58
7.4	47.91	13.75
8.3	47.81	13.93
9.3	47.70	14.11
10.3	47.58	14.29
11.3	47.44	14.47
12.3	47.31	14.66
13.3	47.16	14.81
14.3	47.01	14.95
15.3	46.87	15.06
16.3	46.72	15.17
17.3	46.58	15.27
18.3	46.45	15.35
19.3	46.32	15.43
20.3	46.20	15.51
21.3	46.08	15.59
22.3	45.97	15.68
23.3	45.85	15.79
24.3	45.72	15.90
25.3	45.58	16.01
26.3	45.44	16.10
27.3	45.29	16.19
28.3	45.13	16.25
29.3	44.98	16.29
30.3	44.83	16.29
31.3	44.69	16.28

6.92 +6.84
9^h 25^m $39^s.275$
+81° 41′ 10″.13

ζ Chamæleontis. Mag. 5.2

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	9 36	−80 35
	s	″
0.4	24.29	4.94
1.4	24.20	5.22
2.4	24.11	5.50
3.4	24.02	5.81
4.4	23.93	6.11
5.4	23.83	6.40
6.4	23.70	6.69
7.4	23.58	6.94
8.4	23.46	7.17
9.4	23.34	7.39
10.3	23.22	7.59
11.3	23.11	7.77
12.3	23.00	7.96
13.3	22.89	8.17
14.3	22.79	8.39
15.3	22.68	8.62
16.3	22.58	8.84
17.3	22.47	9.06
18.3	22.36	9.28
19.3	22.23	9.50
20.3	22.11	9.70
21.3	21.98	9.89
22.3	21.85	10.08
23.3	21.72	10.24
24.3	21.58	10.38
25.3	21.45	10.51
26.3	21.32	10.64
27.3	21.21	10.76
28.3	21.10	10.90
29.3	20.98	11.07
30.3	20.87	11.24
31.3	20.74	11.42

6.11 −6.03
9^h 36^m $19^s.026$
−80° 34′ 39″.26

30 H. Camelop. Mag. 5.3

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	10 21	+82 58
	s	″
0.4	31.01	16.32
1.4	30.88	16.56
2.4	30.76	16.80
3.4	30.64	17.00
4.4	30.53	17.20
5.4	30.43	17.38
6.4	30.34	17.58
7.4	30.25	17.80
8.4	30.15	18.02
9.4	30.05	18.26
10.4	29.94	18.50
11.4	29.81	18.75
12.4	29.67	19.00
13.4	29.52	19.24
14.4	29.37	19.44
15.4	29.21	19.64
16.4	29.06	19.82
17.4	28.90	19.97
18.4	28.76	20.13
19.4	28.62	20.29
20.4	28.49	20.44
21.4	28.36	20.59
22.3	28.23	20.74
23.3	28.12	20.92
24.3	27.99	21.09
25.3	27.84	21.26
26.3	27.69	21.41
27.3	27.51	21.56
28.3	27.34	21.70
29.3	27.16	21.81
30.3	26.99	21.92
31.3	26.83	21.98

8.17 +8.11
10^h 21^m $19^s.949$
+82° 58′ 17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. *seq.* Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Apr.	11 0	−84 9	Apr.	12 14	+88 8	Apr.	12 46	−84 41	Apr.	12 48	+83 50	Apr.	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
0.4	7.31	49.94	0.5	61.84	47.54	0.5	38.07	12.51	0.5	41.50	59.92	0.5	55.57	25.91
1.4	7.24	50.28	1.5	61.65	47.87	1.5	38.12	12.88	1.5	41.48	60.27	1.5	55.68	26.25
2.4	7.17	50.65	2.5	61.43	48.18	2.5	38.18	13.25	2.5	41.45	60.60	2.5	55.79	26.61
3.4	7.11	51.03	3.5	61.21	48.47	3.5	38.24	13.64	3.5	41.41	60.91	3.5	55.92	26.98
4.4	7.02	51.42	4.5	61.01	48.75	4.5	38.29	14.05	4.5	41.38	61.20	4.5	56.03	27.38
5.4	6.93	51.80	5.5	60.83	49.02	5.5	38.33	14.46	5.5	41.36	61.48	5.5	56.13	27.79
6.4	6.82	52.18	6.5	60.69	49.29	6.5	38.34	14.88	6.5	41.35	61.76	6.5	56.20	28.21
7.4	6.69	52.53	7.5	60.57	49.56	7.5	38.34	15.30	7.5	41.35	62.04	7.5	56.25	28.62
8.4	6.55	52.87	8.5	60.46	49.85	8.5	38.30	15.68	8.5	41.35	62.34	8.5	56.29	29.00
9.4	6.41	53.18	9.5	60.33	50.16	9.5	38.27	16.06	9.5	41.35	62.65	9.5	56.31	29.38
10.4	6.28	53.47	10.5	60.17	50.48	10.5	38.24	16.40	10.5	41.34	62.97	10.5	56.32	29.74
11.4	6.16	53.77	11.5	59.99	50.83	11.5	38.21	16.75	11.5	41.30	63.32	11.5	56.34	30.08
12.4	6.05	54.06	12.5	59.75	51.16	12.5	38.20	17.09	12.5	41.26	63.67	12.5	56.37	30.42
13.4	5.94	54.34	13.5	59.47	51.50	13.5	38.18	17.42	13.5	41.20	64.02	13.5	56.41	30.75
14.4	5.83	54.63	14.4	59.15	51.82	14.5	38.17	17.75	14.5	41.14	64.36	14.5	56.45	31.09
15.4	5.72	54.94	15.4	58.82	52.12	15.5	38.17	18.10	15.5	41.07	64.68	15.5	56.50	31.43
16.4	5.62	55.25	16.4	58.45	52.41	16.5	38.17	18.46	16.5	40.99	65.00	16.5	56.55	31.77
17.4	5.51	55.56	17.4	58.09	52.69	17.5	38.16	18.82	17.5	40.91	65.32	17.5	56.59	32.13
18.4	5.38	55.89	18.4	57.75	52.96	18.5	38.15	19.19	18.5	40.84	65.60	18.5	56.63	32.50
19.4	5.26	56.21	19.4	57.40	53.20	19.5	38.12	19.57	19.5	40.76	65.88	19.5	56.67	32.89
20.4	5.12	56.53	20.4	57.07	53.44	20.5	38.09	19.95	20.5	40.70	66.15	20.5	56.68	33.27
21.4	4.97	56.82	21.4	56.77	53.68	21.5	38.05	20.34	21.5	40.64	66.42	21.5	56.69	33.67
22.4	4.81	57.10	22.4	56.48	53.95	22.4	37.99	20.71	22.5	40.59	66.70	22.5	56.68	34.06
23.4	4.64	57.38	23.4	56.20	54.21	23.4	37.93	21.08	23.4	40.53	66.98	23.5	56.64	34.44
24.4	4.47	57.63	24.4	55.90	54.48	24.4	37.84	21.42	24.4	40.48	67.27	24.5	56.61	34.81
25.4	4.32	57.87	25.4	55.58	54.75	25.4	37.75	21.75	25.4	40.39	67.58	25.5	56.57	35.15
26.4	4.16	58.11	26.4	55.21	55.03	26.4	37.70	22.08	26.4	40.31	67.89	26.5	56.54	35.48
27.4	4.01	58.34	27.4	54.79	55.30	27.4	37.63	22.39	27.4	40.22	68.19	27.5	56.52	35.80
28.4	3.86	58.59	28.4	54.31	55.55	28.4	37.57	22.70	28.4	40.11	68.49	28.5	56.51	36.12
29.4	3.74	58.86	29.4	53.80	55.80	29.4	37.53	23.02	29.4	39.98	68.78	29.5	56.51	36.45
30.4	3.61	59.13	30.4	53.29	56.02	30.4	37.50	23.36	30.4	39.85	69.03	30.5	56.52	36.79
31.3	3.47	59.41	31.4	52.77	56.22	31.4	37.46	23.72	31.4	39.72	69.28	31.5	56.53	37.16
	9.84	−9.79		30.94	+30.92		10.80	−10.76		9.34	+9.28		12.40	−12.36
10^h	59^m	$54^s.546$	12^h	14^m	$29^s.190$	12^h	46^m	$19^s.119$	12^h	48^m	$31^s.308$	13^h	27^m	$32^s.891$
−84°	9′	29″.33	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Apr.	14 14	−83 17	Apr.	15 3	+87 32	Apr.	15 24	−84 11	Apr.	16 54	+82 10	Apr.	17 16	−80 46
	s	″		s	″		s	″		s	″		s	″
0.6	2.90	56.06	0.6	12.82	26.08	0.6	41.55	48.95	0.7	13.45	3.55	0.7	26.66	57.58
1.6	3.01	56.37	1.6	13.06	26.39	1.6	41.73	49.18	1.7	13.59	3.75	1.7	26.81	57.65
2.6	3.14	56.69	2.6	13.26	26.70	2.6	41.92	49.41	2.7	13.72	3.96	2.7	26.98	57.73
3.6	3.27	57.02	3.6	13.45	26.99	3.6	42.14	49.67	3.7	13.85	4.17	3.7	27.15	57.80
4.6	3.40	57.38	4.6	13.62	27.28	4.6	42.35	49.94	4.7	13.97	4.37	4.7	27.33	57.90
5.6	3.50	57.76	5.6	13.81	27.53	5.6	42.55	50.25	5.7	14.09	4.54	5.7	27.50	58.04
6.6	3.61	58.15	6.6	14.01	27.78	6.6	42.75	50.57	6.7	14.21	4.70	6.7	27.68	58.19
7.6	3.70	58.53	7.6	14.23	28.02	7.6	42.93	50.90	7.7	14.33	4.85	7.7	27.84	58.37
8.5	3.77	58.91	8.6	14.47	28.28	8.6	43.07	51.23	8.7	14.46	5.01	8.7	27.99	58.54
9.5	3.83	59.29	9.6	14.72	28.55	9.6	43.21	51.56	9.7	14.60	5.18	9.7	28.13	58.73
10.5	3.88	59.63	10.6	14.97	28.83	10.6	43.34	51.86	10.7	14.73	5.37	10.7	28.27	58.91
11.5	3.94	59.96	11.6	15.20	29.15	11.6	43.46	52.14	11.7	14.87	5.58	11.7	28.40	59.07
12.5	3.99	60.29	12.6	15.41	29.47	12.6	43.59	52.42	12.6	15.00	5.81	12.7	28.53	59.21
13.5	4.05	60.60	13.6	15.60	29.80	13.6	43.72	52.70	13.6	15.13	6.05	13.7	28.65	59.36
14.5	4.11	60.92	14.6	15.75	30.15	14.6	43.87	52.96	14.6	15.24	6.32	14.7	28.79	59.49
15.5	4.20	61.23	15.6	15.88	30.50	15.6	44.01	53.22	15.6	15.35	6.59	15.7	28.92	59.63
16.5	4.27	61.56	16.6	15.98	30.82	16.6	44.16	53.49	16.6	15.47	6.86	16.7	29.06	59.77
17.5	4.35	61.90	17.6	16.08	31.15	17.6	44.31	53.77	17.6	15.58	7.13	17.6	29.21	59.92
18.5	4.42	62.25	18.6	16.15	31.47	18.6	44.47	54.08	18.6	15.67	7.40	18.6	29.36	60.07
19.5	4.48	62.62	19.6	16.23	31.76	19.6	44.62	54.40	19.6	15.77	7.65	19.6	29.51	60.25
20.5	4.54	62.98	20.5	16.31	32.05	20.6	44.77	54.72	20.6	15.86	7.90	20.6	29.66	60.44
21.5	4.60	63.36	21.5	16.39	32.34	21.6	44.91	55.06	21.6	15.97	8.13	21.6	29.80	60.63
22.5	4.64	63.74	22.5	16.48	32.63	22.6	45.02	55.41	22.6	16.07	8.35	22.6	29.95	60.87
23.5	4.67	64.13	23.5	16.59	32.91	23.6	45.12	55.76	23.6	16.16	8.58	23.6	30.08	61.10
24.5	4.68	64.49	24.5	16.70	33.20	24.6	45.22	56.10	24.6	16.27	8.82	24.6	30.21	61.31
25.5	4.69	64.84	25.5	16.81	33.51	25.5	45.31	56.44	25.6	16.37	9.09	25.6	30.31	61.52
26.5	4.71	65.18	26.5	16.89	33.84	26.5	45.39	56.74	26.6	16.47	9.35	26.6	30.42	61.73
27.5	4.74	65.49	27.5	16.94	34.18	27.5	45.48	57.03	27.6	16.56	9.65	27.6	30.53	61.92
28.5	4.77	65.81	28.5	16.95	34.55	28.5	45.58	57.31	28.6	16.65	9.97	28.6	30.65	62.10
29.5	4.82	66.13	29.5	16.93	34.90	29.5	45.70	57.60	29.6	16.73	10.30	29.6	30.78	62.26
30.5	4.86	66.46	30.5	16.87	35.24	30.5	45.83	57.91	30.6	16.79	10.63	30.6	30.91	62.44
31.5	4.91	66.83	31.5	16.80	35.57	31.5	45.95	58.23	31.6	16.85	10.95	31.6	31.05	62.62
	8.57	−8.51		23.32	+23.29		9.89	−9.84		7.34	+7.27		6.24	−6.16
14^h 13^m $46^s.350$			15^h 3^m $2^s.510$			15^h 24^m $23^s.351$			16^h 54^m $12^s.991$			17^h 16^m $17^s.234$		
−83° 17′ 54″.52			+87° 32′ 42″.66			−84° 11′ 55″.43			+82° 10′ 21″.42			−80° 47′ 14″.27		

5934°—1919——17

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	17 58	+86 36
	s	″
0.7	15.90	35.07
1.7	16.26	35.18
2.7	16.60	35.31
3.7	16.93	35.43
4.7	17.25	35.54
5.7	17.53	35.65
6.7	17.85	35.75
7.7	18.16	35.84
8.7	18.49	35.93
9.7	18.83	36.02
10.7	19.19	36.15
11.7	19.55	36.28
12.7	19.92	36.41
13.7	20.27	36.58
14.7	20.61	36.76
15.7	20.94	36.95
16.7	21.26	37.15
17.7	21.55	37.35
18.7	21.85	37.55
19.7	22.13	37.75
20.7	22.40	37.94
21.7	22.67	38.11
22.7	22.94	38.28
23.7	23.22	38.45
24.7	23.51	38.62
25.7	23.81	38.80
26.7	24.11	39.01
27.7	24.41	39.24
28.6	24.70	39.50
29.6	24.96	39.77
30.6	25.20	40.04
31.6	25.41	40.31

16.91 +16.88
17^h 58^m $22^s.311$
+86° 36′ 51″.04

χ Octantis. Mag. 5.2

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	18 7	−87 39
	s	″
0.7	48.20	29.35
1.7	48.80	29.35
2.7	49.44	29.35
3.7	50.11	29.35
4.7	50.80	29.38
5.7	51.50	29.42
6.7	52.19	29.50
7.7	52.85	29.59
8.7	53.49	29.70
9.7	54.09	29.80
10.7	54.65	29.90
11.7	55.20	29.99
12.7	55.72	30.09
13.7	56.27	30.16
14.7	56.82	30.22
15.7	57.39	30.29
16.7	57.97	30.37
17.7	58.57	30.46
18.7	59.18	30.55
19.7	59.80	30.65
20.7	60.43	30.77
21.7	61.05	30.91
22.7	61.65	31.08
23.7	62.22	31.25
24.7	62.75	31.40
25.7	63.27	31.56
26.7	63.77	31.71
27.7	64.26	31.85
28.7	64.76	31.97
29.7	65.28	32.09
30.6	65.84	32.21
31.6	66.44	32.35

24.48 −24.45
18^h 7^m $23^s.343$
−87° 39′ 50″.89

λ Ursæ Minoris. Mag. 6.6

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	18 59	+89 0
	s	″
0.8	33.64	59.60
1.8	34.98	59.63
2.8	36.25	59.67
3.8	37.43	59.73
4.8	38.55	59.79
5.8	39.63	59.81
6.8	40.70	59.82
7.7	41.80	59.83
8.7	42.96	59.83
9.7	44.20	59.84
10.7	45.49	59.85
11.7	46.83	59.89
12.7	48.18	59.94
13.7	49.53	60.02
14.7	50.84	60.12
15.7	52.12	60.23
16.7	53.35	60.34
17.7	54.53	60.46
18.7	55.66	60.57
19.7	56.75	60.70
20.7	57.80	60.81
21.7	58.84	60.92
22.7	59.91	61.02
23.7	61.00	61.11
24.7	62.13	61.21
25.7	63.31	61.34
26.7	64.53	61.46
27.7	65.75	61.61
28.7	66.93	61.79
29.7	68.04	61.99
30.7	69.08	62.20
31.7	70.03	62.41

58.27 +58.26
19^h 0^m $15^s.079$
+89° 1′ 12″.80

σ Octantis. Mag. 5.5

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	19 31	−89 12
	s	″
0.8	19.21	47.92
1.8	20.87	47.78
2.8	22.61	47.63
3.8	24.46	47.49
4.8	26.42	47.37
5.8	28.43	47.27
6.8	30.47	47.20
7.8	32.47	47.15
8.8	34.41	47.11
9.8	36.24	47.07
10.8	37.97	47.04
11.8	39.65	47.01
12.8	41.29	46.97
13.8	42.91	46.92
14.8	44.56	46.87
15.7	46.25	46.80
16.7	48.00	46.74
17.7	49.79	46.70
18.7	51.65	46.66
19.7	53.56	46.63
20.7	55.51	46.62
21.7	57.46	46.62
22.7	59.38	46.65
23.7	61.24	46.68
24.7	63.04	46.73
25.7	64.74	46.77
26.7	66.37	46.81
27.7	67.97	46.83
28.7	69.59	46.84
29.7	71.25	46.83
30.7	73.01	46.82
31.7	74.86	46.82

72.81 −72.80
19^h 30^m $50^s.769$
−89° 13′ 13″.35

76 Draconis. Mag. 5.7

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Apr.	20 48	+82 13
	s	″
0.8	26.09	49.32
1.8	26.25	49.18
2.8	26.41	49.08
3.8	26.57	48.99
4.8	26.72	48.91
5.8	26.86	48.82
6.8	27.00	48.71
7.8	27.13	48.58
8.8	27.27	48.46
9.8	27.41	48.33
10.8	27.56	48.21
11.8	27.71	48.10
12.8	27.89	48.00
13.8	28.06	47.92
14.8	28.24	47.85
15.8	28.40	47.80
16.8	28.57	47.77
17.8	28.74	47.76
18.8	28.90	47.75
19.8	29.06	47.74
20.8	29.21	47.72
21.8	29.36	47.70
22.8	29.51	47.67
23.8	29.66	47.64
24.8	29.82	47.60
25.8	29.97	47.56
26.8	30.15	47.55
27.8	30.33	47.55
28.8	30.50	47.59
29.8	30.68	47.64
30.8	30.85	47.72
31.8	31.02	47.81

7.40 +7.33
20^h 48^m $32^s.146$
+82° 13′ 56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Apr.	21 38	−83 5	Apr.	22 16	−86 22	Apr.	22 37	−81 47	Apr.	23 27	+86 51	Apr.	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
0.9	35.37	10.79	0.9	21.47	28.61	0.9	46.41	64.49	0.9	25.41	43.20	0.9	14.90	53.35
1.9	35.50	10.48	1.9	21.65	28.27	1.9	46.48	64.16	1.9	25.60	42.92	1.9	14.92	52.98
2.9	35.63	10.18	2.9	21.84	27.91	2.9	46.55	63.79	2.9	25.83	42.65	2.9	14.94	52.61
3.9	35.77	9.86	3.9	22.06	27.55	3.9	46.63	63.40	3.9	26.03	42.39	3.9	14.97	52.21
4.9	35.95	9.53	4.9	22.30	27.20	4.9	46.73	63.02	4.9	26.23	42.15	4.9	15.01	51.80
5.9	36.12	9.22	5.9	22.56	26.86	5.9	46.83	62.65	5.9	26.42	41.91	5.9	15.07	51.37
6.9	36.30	8.94	6.9	22.85	26.52	6.9	46.96	62.31	6.9	26.57	41.67	6.9	15.15	50.95
7.9	36.49	8.67	7.9	23.15	26.21	7.9	47.09	61.97	7.9	26.72	41.42	7.9	15.22	50.57
8.9	36.67	8.44	8.9	23.45	25.93	8.9	47.21	61.66	8.9	26.87	41.15	8.9	15.30	50.19
9.9	36.84	8.21	9.9	23.74	25.66	9.9	47.31	61.37	9.9	27.04	40.87	9.9	15.38	49.83
10.8	37.02	8.01	10.9	24.01	25.40	10.9	47.42	61.09	10.9	27.22	40.57	10.9	15.45	49.49
11.8	37.16	7.81	11.9	24.25	25.14	11.9	47.53	60.81	11.9	27.42	40.27	11.9	15.51	49.18
12.8	37.31	7.59	12.9	24.50	24.89	12.9	47.63	60.52	12.9	27.65	39.98	12.9	15.57	48.86
13.8	37.46	7.37	13.9	24.73	24.63	13.9	47.72	60.24	13.9	27.91	39.70	13.9	15.63	48.55
14.8	37.60	7.13	14.9	24.96	24.36	14.9	47.81	59.96	14.9	28.19	39.42	14.9	15.68	48.21
15.8	37.75	6.89	15.9	25.20	24.09	15.9	47.90	59.65	15.9	28.47	39.17	15.9	15.73	47.87
16.8	37.92	6.64	16.9	25.46	23.82	16.9	48.01	59.35	16.9	28.75	38.93	16.9	15.78	47.50
17.8	38.09	6.40	17.9	25.72	23.54	17.9	48.12	59.03	17.9	29.03	38.70	17.9	15.86	47.15
18.8	38.25	6.16	18.9	26.00	23.25	18.9	48.23	58.72	18.9	29.32	38.50	18.9	15.93	46.78
19.8	38.44	5.92	19.9	26.31	22.97	19.9	48.36	58.40	19.9	29.60	38.30	19.9	16.03	46.40
20.8	38.63	5.70	20.8	26.62	22.71	20.9	48.50	58.11	20.9	29.85	38.10	20.9	16.12	46.02
21.8	38.83	5.49	21.8	26.95	22.44	21.9	48.63	57.82	21.9	30.10	37.87	21.9	16.22	45.66
22.8	39.04	5.29	22.8	27.29	22.17	22.9	48.77	57.54	22.9	30.34	37.66	22.9	16.33	45.32
23.8	39.24	5.10	23.8	27.62	21.94	23.9	48.92	57.27	23.9	30.58	37.44	23.9	16.44	44.99
24.8	39.43	4.93	24.8	27.95	21.74	24.9	49.06	57.04	24.9	30.84	37.22	24.9	16.54	44.67
25.8	39.61	4.79	25.8	28.27	21.53	25.8	49.20	56.81	25.9	31.11	36.98	25.9	16.64	44.37
26.8	39.78	4.64	26.8	28.56	21.33	26.8	49.32	56.58	26.9	31.41	36.75	26.9	16.74	44.08
27.8	39.95	4.48	27.8	28.83	21.13	27.8	49.42	56.35	27.9	31.73	36.54	27.9	16.83	43.79
28.8	40.11	4.30	28.8	29.11	20.91	28.8	49.54	56.10	28.9	32.09	36.35	28.9	16.91	43.48
29.8	40.27	4.11	29.8	29.39	20.69	29.8	49.66	55.83	29.9	32.47	36.18	29.9	16.99	43.16
30.8	40.45	3.90	30.8	29.68	20.43	30.8	49.78	55.56	30.9	32.84	36.02	30.9	17.07	42.82
31.8	40.64	3.69	31.8	30.00	20.18	31.8	49.92	55.28	31.9	33.19	35.88	31.9	17.17	42.46
8.31		−8.24	15.81		−15.78	7.01		−6.94	18.26		+18.23	7.62		−7.56
21^h	38^m	$38^s.548$	22^h	16^m	$33^s.212$	22^h	37^m	$51^s.624$	23^h	27^m	$43^s.571$	23^h	47^m	$23^s.637$
−83°	5′	34″.33	−86°	22′	50″.92	−81°	48′	24″.80	+86°	51′	38″.62	−82°	28′	8″.42

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
May	0 57	+85 49	May	1 30	+88 52	May	1 41	−85 10	May	4 10	+85 20	May	5 35	+85 9
	s	″		s	″		s	″		s	″		s	″
0.9	16.95	25.54	0.9	39.45	23.75	0.9	35.12	30.40	1.1	35.11	37.35	1.1	50.65	44.31
1.9	17.16	25.30	1.9	40.05	23.48	1.9	35.12	30.01	2.1	35.10	37.06	2.1	50.55	44.04
2.9	17.35	25.10	2.9	40.63	23.24	2.9	35.13	29.60	3.1	35.08	36.77	3.1	50.45	43.80
3.9	17.54	24.90	3.9	41.14	23.00	3.9	35.17	29.20	4.1	35.05	36.50	4.1	50.36	43.57
4.9	17.70	24.69	4.9	41.60	22.76	4.9	35.22	28.80	5.1	35.01	36.24	5.1	50.26	43.36
5.9	17.85	24.47	5.9	42.02	22.52	5.9	35.31	28.40	6.1	34.96	35.98	6.1	50.14	43.14
6.9	18.00	24.23	6.9	42.42	22.25	6.9	35.39	28.03	7.1	34.90	35.72	7.1	50.01	42.91
7.9	18.15	23.98	7.9	42.85	21.99	7.9	35.47	27.68	8.0	34.83	35.44	8.1	49.86	42.67
8.9	18.32	23.73	8.9	43.33	21.71	8.9	35.55	27.35	9.0	34.76	35.12	9.1	49.72	42.41
9.9	18.50	23.46	9.9	43.88	21.41	9.9	35.61	27.03	10.0	34.71	34.80	10.1	49.57	42.14
10.9	18.72	23.20	10.9	44.50	21.12	10.9	35.67	26.72	11.0	34.69	34.46	11.1	49.44	41.86
11.9	18.94	22.95	11.9	45.18	20.83	11.9	35.73	26.41	12.0	34.68	34.11	12.1	49.33	41.54
12.9	19.17	22.70	12.9	45.91	20.56	12.9	35.78	26.09	13.0	34.68	33.77	13.1	49.22	41.22
13.9	19.41	22.47	13.9	46.67	20.32	13.9	35.84	25.76	14.0	34.69	33.45	14.1	49.12	40.92
14.9	19.66	22.27	14.9	47.45	20.08	14.9	35.90	25.43	15.0	34.70	33.12	15.1	49.06	40.62
15.9	19.91	22.08	15.9	48.23	19.84	15.9	35.97	25.07	16.0	34.74	32.82	16.1	49.00	40.33
16.9	20.16	21.91	16.9	49.00	19.62	16.9	36.06	24.71	17.0	34.78	32.53	17.1	48.95	40.03
17.9	20.40	21.75	17.9	49.76	19.42	17.9	36.15	24.35	18.0	34.82	32.24	18.1	48.90	39.76
18.9	20.63	21.59	18.9	50.47	19.21	18.9	36.26	24.00	19.0	34.85	31.95	19.1	48.85	39.49
19.9	20.85	21.44	19.9	51.15	19.01	19.9	36.37	23.65	20.0	34.89	31.69	20.1	48.80	39.22
20.9	21.05	21.26	20.9	51.81	18.81	20.9	36.50	23.31	21.0	34.90	31.43	21.1	48.74	38.96
21.9	21.25	21.09	21.9	52.47	18.58	21.9	36.64	22.98	22.0	34.91	31.15	22.1	48.66	38.71
22.9	21.48	20.91	22.9	53.16	18.36	22.9	36.78	22.66	23.0	34.94	30.84	23.1	48.58	38.43
23.9	21.71	20.72	23.9	53.89	18.13	23.9	36.92	22.37	24.0	34.97	30.53	24.1	48.52	38.13
24.9	21.97	20.53	24.9	54.70	17.89	24.9	37.03	22.08	25.0	34.99	30.22	25.1	48.45	37.81
25.9	22.24	20.35	25.9	55.61	17.66	25.9	37.13	21.81	25.9	35.03	29.88	26.1	48.39	37.48
26.9	22.53	20.19	26.9	56.58	17.45	26.9	37.23	21.53	26.9	35.10	29.53	27.1	48.35	37.13
27.9	22.85	20.05	27.9	57.61	17.25	27.9	37.32	21.24	27.9	35.20	29.19	28.1	48.35	36.79
28.9	23.16	19.94	28.9	58.65	17.09	28.9	37.43	20.92	28.9	35.33	28.90	29.0	48.37	36.47
29.9	23.45	19.84	29.9	59.66	16.95	29.9	37.55	20.59	29.9	35.45	28.61	30.0	48.40	36.15
30.9	23.74	19.76	30.9	60.61	16.81	30.9	37.68	20.25	30.9	35.57	28.34	31.0	48.43	35.87
31.8	24.01	19.69	31.9	61.50	16.68	31.9	37.83	19.90	31.9	35.68	28.09	32.0	48.46	35.58

13.73 +13.69	50.81 +50.80	11.89 −11.84	12.32 +12.28	11.86 +11.81
0h 57m 24s.633	1h 31m 11s.709	1h 41m 54s.846	4h 10m 37s.831	5h 35m 50s.330
+85° 49′ 24″.14	+88° 52′ 20″.55	−85° 10′ 45″.22	+85° 20′ 28″.88	+85° 9′ 34″.51

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
May	5 45	−84 49	May	6 46	−80 44	May	7 2	+87 10	May	7 14	+82 34	May	7 15	−86 54
	s	″		s	″		s	″		s	″		s	″
1.1	33.54	61.16	1.2	41.72	9.77	1.2	66.95	53.89	1.2	11.08	26.59	1.2	18.77	45.46
2.1	33.29	60.98	2.2	41.58	9.67	2.2	66.65	53.70	2.2	10.97	26.43	2.2	18.31	45.41
3.1	33.05	60.75	3.2	41.44	9.54	3.2	66.36	53.52	3.2	10.87	26.29	3.2	17.83	45.35
4.1	32.82	60.52	4.2	41.30	9.40	4.2	66.08	53.37	4.2	10.77	26.13	4.2	17.36	45.26
5.1	32.62	60.28	5.2	41.16	9.23	5.2	65.80	53.22	5.2	10.66	25.99	5.2	16.90	45.16
6.1	32.41	60.01	6.2	41.02	9.04	6.2	65.48	53.07	6.2	10.53	25.87	6.2	16.46	45.02
7.1	32.22	59.75	7.2	40.89	8.84	7.2	65.15	52.92	7.2	10.41	25.75	7.2	16.05	44.88
8.1	32.05	59.50	8.2	40.76	8.66	8.2	64.78	52.75	8.2	10.27	25.62	8.2	15.65	44.73
9.1	31.87	59.25	9.2	40.66	8.48	9.2	64.42	52.58	9.2	10.13	25.47	9.2	15.27	44.60
10.1	31.70	59.01	10.1	40.54	8.32	10.2	64.04	52.39	10.2	9.99	25.29	10.2	14.91	44.47
11.1	31.53	58.79	11.1	40.43	8.16	11.2	63.67	52.16	11.2	9.84	25.11	11.2	14.55	44.37
12.1	31.36	58.58	12.1	40.32	8.01	12.2	63.33	51.94	12.2	9.70	24.89	12.2	14.19	44.26
13.1	31.19	58.36	13.1	40.21	7.86	13.2	62.99	51.71	13.2	9.58	24.67	13.2	13.82	44.15
14.1	31.01	58.14	14.1	40.09	7.71	14.2	62.70	51.46	14.2	9.45	24.44	14.2	13.44	44.05
15.1	30.83	57.92	15.1	39.98	7.56	15.1	62.41	51.20	15.2	9.35	24.21	15.2	13.05	43.95
16.1	30.65	57.69	16.1	39.85	7.38	16.1	62.16	50.94	16.2	9.26	23.97	16.2	12.66	43.82
17.1	30.47	57.45	17.1	39.73	7.20	17.1	61.91	50.71	17.1	9.16	23.74	17.2	12.25	43.69
18.1	30.29	57.17	18.1	39.62	6.99	18.1	61.68	50.49	18.1	9.08	23.55	18.1	11.84	43.51
19.1	30.12	56.88	19.1	39.51	6.77	19.1	61.46	50.26	19.1	9.00	23.34	19.1	11.45	43.34
20.1	29.95	56.58	20.1	39.39	6.55	20.1	61.24	50.03	20.1	8.91	23.15	20.1	11.06	43.16
21.1	29.80	56.28	21.1	39.28	6.30	21.1	61.00	49.81	21.1	8.82	22.96	21.1	10.67	42.97
22.1	29.66	55.98	22.1	39.18	6.05	22.1	60.73	49.60	22.1	8.73	22.77	22.1	10.32	42.77
23.1	29.54	55.68	23.1	39.07	5.80	23.1	60.46	49.38	23.1	8.63	22.57	23.1	9.99	42.56
24.1	29.42	55.39	24.1	38.98	5.57	24.1	60.19	49.15	24.1	8.52	22.34	24.1	9.67	42.37
25.1	29.30	55.11	25.1	38.89	5.37	25.1	59.92	48.89	25.1	8.40	22.09	25.1	9.35	42.20
26.1	29.17	54.86	26.1	38.80	5.16	26.1	59.66	48.61	26.1	8.29	21.82	26.1	9.04	42.05
27.1	29.04	54.63	27.1	38.70	4.96	27.1	59.43	48.30	27.1	8.20	21.53	27.1	8.73	41.90
28.1	28.90	54.39	28.1	38.61	4.78	28.1	59.24	47.98	28.1	8.13	21.23	28.1	8.39	41.75
29.1	28.76	54.12	29.1	38.52	4.59	29.1	59.08	47.67	29.1	8.08	20.94	29.1	8.03	41.60
30.1	28.61	53.84	30.1	38.42	4.36	30.1	58.95	47.38	30.1	8.03	20.66	30.1	7.67	41.42
31.0	28.46	53.52	31.1	38.31	4.10	31.1	58.84	47.10	31.1	7.99	20.40	31.1	7.30	41.23
32.0	28.33	53.19	32.1	38.21	3.83	32.1	58.73	46.83	32.1	7.95	20.16	32.1	6.94	41.00
	11.10	−11.06		6.21	−6.13		20.33	+20.31		7.74	+7.67		18.56	−18.54
	5h 45m 51s.396			6h 46m 48s.653			7h 3m 2s.335			7h 14m 7s.912			7h 15m 39s.691	
	−84° 49′ 44″.27			−80° 43′ 46″.14			+87° 10′ 43″.86			+82° 34′ 17″.32			−86° 54′ 19″.75	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
May	8 17	+88 52	May	9 8	−85 20	May	9 25	+81 41	May	9 36	−80 35	May	10 21	+82 58
	s	″		s	″		s	″		s	″		s	″
1.2	67.25	46.87	1.3	39.98	58.33	1.3	44.69	16.28	1.3	20.74	11.42	1.3	26.83	21.98
2.2	66.30	46.76	2.3	39.71	58.47	2.3	44.56	16.27	2.3	20.62	11.59	2.3	26.68	22.02
3.2	65.40	46.66	3.3	39.41	58.59	3.3	44.46	16.26	3.3	20.50	11.74	3.3	26.54	22.08
4.2	64.53	46.57	4.3	39.10	58.68	4.3	44.33	16.26	4.3	20.36	11.88	4.3	26.41	22.16
5.2	63.65	46.51	5.3	38.79	58.75	5.3	44.21	16.28	5.3	20.21	12.00	5.3	26.28	22.24
6.2	62.72	46.45	6.3	38.48	58.81	6.3	44.09	16.31	6.3	20.08	12.09	6.3	26.14	22.34
7.2	61.75	46.38	7.3	38.19	58.85	7.3	43.96	16.35	7.3	19.94	12.15	7.3	25.99	22.44
8.2	60.72	46.29	8.3	37.92	58.88	8.3	43.83	16.39	8.3	19.80	12.22	8.3	25.83	22.55
9.2	59.64	46.20	9.3	37.64	58.90	9.3	43.68	16.40	9.3	19.67	12.27	9.3	25.66	22.64
10.2	58.52	46.10	10.2	37.39	58.93	10.3	43.52	16.41	10.3	19.54	12.33	10.3	25.48	22.73
11.2	57.41	45.97	11.2	37.14	58.96	11.3	43.37	16.41	11.3	19.43	12.39	11.3	25.30	22.80
12.2	56.33	45.84	12.2	36.89	59.02	12.3	43.21	16.39	12.3	19.32	12.45	12.3	25.11	22.86
13.2	55.25	45.70	13.2	36.65	59.07	13.3	43.06	16.35	13.3	19.19	12.54	13.3	24.93	22.90
14.2	54.24	45.53	14.2	36.38	59.11	14.2	42.91	16.29	14.3	19.07	12.63	14.3	24.75	22.93
15.2	53.29	45.35	15.2	36.12	59.16	15.2	42.77	16.22	15.3	18.95	12.71	15.3	24.57	22.94
16.2	52.37	45.17	16.2	35.84	59.21	16.2	42.64	16.14	16.3	18.83	12.77	16.3	24.42	22.95
17.2	51.51	45.01	17.2	35.56	59.26	17.2	42.52	16.06	17.2	18.70	12.84	17.3	24.27	22.94
18.2	50.69	44.84	18.2	35.28	59.27	18.2	42.40	16.00	18.2	18.56	12.90	18.3	24.12	22.92
19.2	49.89	44.69	19.2	34.99	59.27	19.2	42.27	15.93	19.2	18.42	12.95	19.3	23.97	22.92
20.2	49.11	44.54	20.2	34.68	59.26	20.2	42.17	15.87	20.2	18.28	12.96	20.3	23.83	22.93
21.2	48.29	44.40	21.2	34.39	59.23	21.2	42.04	15.81	21.2	18.15	12.97	21.3	23.68	22.94
22.2	47.42	44.26	22.2	34.11	59.19	22.2	41.92	15.76	22.2	18.01	12.97	22.3	23.53	22.96
23.2	46.52	44.11	23.2	33.83	59.14	23.2	41.79	15.71	23.2	17.87	12.95	23.3	23.36	22.97
24.2	45.58	43.94	24.2	33.58	59.09	24.2	41.66	15.65	24.2	17.74	12.93	24.3	23.19	22.98
25.2	44.61	43.75	25.2	33.34	59.05	25.2	41.51	15.56	25.2	17.64	12.92	25.3	23.01	22.99
26.2	43.65	43.52	26.2	33.10	59.04	26.2	41.36	15.44	26.2	17.52	12.93	26.3	22.81	22.95
27.2	42.77	43.29	27.2	32.87	59.03	27.2	41.22	15.31	27.2	17.41	12.94	27.3	22.63	22.91
28.2	41.96	43.04	28.2	32.62	59.03	28.2	41.08	15.14	28.2	17.30	12.98	28.3	22.46	22.83
29.2	41.23	42.78	29.2	32.35	59.04	29.2	40.98	14.97	29.2	17.17	13.02	29.2	22.31	22.73
30.2	40.57	42.53	30.2	32.08	59.03	30.2	40.88	14.82	30.2	17.05	13.03	30.2	22.16	22.63
31.2	39.98	42.29	31.2	31.80	58.99	31.2	40.78	14.66	31.2	16.91	13.03	31.2	22.02	22.53
32.2	39.39	42.06	32.2	31.50	58.93	32.2	40.68	14.52	32.2	16.78	12.99	32.2	21.90	22.44
51.13		+51.12	12.33		−12.29	6.92		+6.84	6.11		−6.03	8.17		+8.11
8^h	17^m	$47^s.546$	9^h	8^m	$41^s.594$	9^h	25^m	$39^s.275$	9^h	36^m	$19^s.026$	10^h	21^m	$19^s.949$
+88°	52′	37″.80	−85°	20′	26″.78	+81°	41′	10″.13	−80°	34′	39″.26	+82°	58′	17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. *seq.* Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
May	10 59	−84 9	May	12 14	+88 8	May	12 46	−84 41	May	12 48	+83 51	May	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
1.3	63.47	59.41	1.4	52.77	56.22	1.4	37.46	23.72	1.4	39.72	9.28	1.5	56.53	37.16
2.3	63.32	59.69	2.4	52.29	56.42	2.4	37.41	24.09	2.4	39.62	9.50	2.4	56.53	37.55
3.3	63.15	59.98	3.4	51.85	56.60	3.4	37.33	24.46	3.4	39.51	9.72	3.4	56.50	37.94
4.3	62.98	60.25	4.4	51.43	56.80	4.4	37.25	24.83	4.4	39.40	9.94	4.4	56.45	38.33
5.3	62.79	60.49	5.4	51.04	57.00	5.4	37.16	25.17	5.4	39.31	10.16	5.4	56.38	38.71
6.3	62.59	60.70	6.4	50.64	57.20	6.4	37.03	25.50	6.4	39.22	10.40	6.4	56.30	39.06
7.3	62.41	60.90	7.4	50.23	57.42	7.4	36.91	25.80	7.4	39.12	10.66	7.4	56.21	39.40
8.3	62.23	61.08	8.4	49.77	57.65	8.4	36.78	26.09	8.4	39.01	10.93	8.4	56.12	39.72
9.3	62.04	61.25	9.4	49.28	57.88	9.4	36.68	26.37	9.4	38.88	11.20	9.4	56.03	40.01
10.3	61.87	61.42	10.4	48.75	58.11	10.4	36.58	26.64	10.4	38.74	11.47	10.4	55.95	40.31
11.3	61.72	61.60	11.4	48.19	58.34	11.4	36.47	26.90	11.4	38.60	11.74	11.4	55.89	40.60
12.3	61.56	61.78	12.4	47.59	58.54	12.4	36.38	27.17	12.4	38.44	11.99	12.4	55.82	40.89
13.3	61.40	61.96	13.4	47.00	58.73	13.4	36.29	27.45	13.4	38.29	12.23	13.4	55.76	41.20
14.3	61.24	62.16	14.4	46.40	58.91	14.4	36.20	27.74	14.4	38.13	12.44	14.4	55.70	41.51
15.3	61.07	62.36	15.4	45.80	59.06	15.4	36.10	28.06	15.4	37.97	12.64	15.4	55.65	41.83
16.3	60.90	62.56	16.4	45.22	59.20	16.4	36.01	28.37	16.4	37.82	12.83	16.4	55.57	42.16
17.3	60.72	62.75	17.4	44.65	59.33	17.4	35.89	28.67	17.4	37.68	13.02	17.4	55.49	42.49
18.3	60.52	62.94	18.4	44.12	59.46	18.4	35.76	28.98	18.4	37.54	13.19	18.4	55.40	42.83
19.3	60.33	63.10	19.4	43.60	59.58	19.4	35.63	29.27	19.4	37.40	13.36	19.4	55.28	43.16
20.3	60.13	63.25	20.3	43.09	59.71	20.4	35.48	29.56	20.4	37.26	13.53	20.4	55.15	43.48
21.3	59.90	63.39	21.3	42.59	59.85	21.4	35.32	29.84	21.4	37.14	13.71	21.4	55.01	43.78
22.3	59.70	63.52	22.3	42.07	60.01	22.4	35.16	30.08	22.4	37.00	13.90	22.4	54.86	44.07
23.3	59.50	63.62	23.3	41.51	60.17	23.4	35.00	30.30	23.4	36.85	14.10	23.4	54.72	44.34
24.3	59.31	63.72	24.3	40.90	60.33	24.4	34.85	30.53	24.4	36.68	14.30	24.4	54.59	44.60
25.3	59.13	63.82	25.3	40.26	60.48	25.4	34.71	30.74	25.4	36.51	14.51	25.4	54.47	44.85
26.3	58.96	63.94	26.3	39.57	60.60	26.4	34.59	30.96	26.4	36.33	14.69	26.4	54.36	45.11
27.3	58.80	64.07	27.3	38.87	60.69	27.4	34.48	31.21	27.4	36.13	14.84	27.4	54.27	45.37
28.3	58.63	64.22	28.3	38.17	60.76	28.4	34.37	31.47	28.4	35.94	14.98	28.4	54.18	45.65
29.3	58.45	64.37	29.3	37.50	60.82	29.3	34.24	31.73	29.3	35.76	15.09	29.4	54.09	45.96
30.3	58.27	64.52	30.3	36.87	60.87	30.3	34.11	32.00	30.3	35.58	15.19	30.4	53.97	46.27
31.3	58.07	64.67	31.3	36.27	60.91	31.3	33.96	32.28	31.3	35.42	15.27	31.4	53.84	46.56
32.3	57.84	64.78	32.3	35.71	60.95	32.3	33.78	32.54	32.3	35.27	15.37	32.4	53.67	46.86
9.84		−9.79	30.97		+30.96	10.81		−10.76	9.34		+9.29	12.41		−12.37
$10^h\ 59^m\ 54^s.546$			$12^h\ 14^m\ 29^s.190$			$12^h\ 46^m\ 19^s.119$			$12^h\ 48^m\ 31^s.308$			$13^h\ 27^m\ 32^s.891$		
−84° 9′ 29″.33			+88° 8′ 56″.19			−84° 41′ 1″.57			+83° 51′ 11″.30			−85° 22′ 19″.48		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
May	14 14	−83 18	May	15 3	+87 32	May	15 24	−84 11	May	16 54	+82 10	May	17 16	−80 47
	s	″		s	″		s	″		s	″		s	″
1.5	4.91	6.83	1.5	16.80	35.57	1.5	45.95	58.23	1.6	16.85	10.95	1.6	31.05	2.62
2.5	4.96	7.21	2.5	16.73	35.86	2.5	46.08	58.57	2.6	16.91	11.24	2.6	31.20	2.84
3.5	5.00	7.58	3.5	16.67	36.14	3.5	46.19	58.93	3.6	16.96	11.52	3.6	31.35	3.08
4.5	5.01	7.95	4.5	16.63	36.42	4.5	46.29	59.30	4.6	17.02	11.78	4.6	31.47	3.35
5.5	5.02	8.34	5.5	16.61	36.69	5.5	46.37	59.67	5.6	17.09	12.04	5.6	31.60	3.61
6.5	5.01	8.71	6.5	16.60	36.97	6.5	46.43	60.02	6.6	17.16	12.30	6.6	31.70	3.89
7.5	4.97	9.05	7.5	16.60	37.28	7.5	46.49	60.36	7.6	17.23	12.57	7.6	31.80	4.17
8.5	4.96	9.38	8.5	16.59	37.60	8.5	46.53	60.68	8.6	17.30	12.88	8.6	31.89	4.40
9.5	4.94	9.70	9.5	16.56	37.94	9.5	46.57	60.99	9.6	17.37	13.19	9.6	31.98	4.65
10.5	4.92	9.98	10.5	16.48	38.30	10.5	46.61	61.29	10.6	17.43	13.52	10.6	32.07	4.87
11.5	4.91	10.28	11.5	16.39	38.65	11.5	46.65	61.58	11.6	17.49	13.86	11.6	32.15	5.09
12.5	4.90	10.57	12.5	16.29	38.99	12.5	46.71	61.87	12.6	17.54	14.23	12.6	32.24	5.31
13.5	4.90	10.89	13.5	16.15	39.33	13.5	46.78	62.18	13.6	17.58	14.57	13.6	32.34	5.53
14.4	4.89	11.20	14.5	15.98	39.66	14.5	46.84	62.49	14.6	17.62	14.92	14.6	32.44	5.75
15.4	4.89	11.52	15.5	15.81	39.97	15.5	46.91	62.80	15.6	17.65	15.26	15.6	32.55	5.97
16.4	4.89	11.85	16.5	15.65	40.26	16.5	46.97	63.13	16.6	17.68	15.59	16.6	32.66	6.22
17.4	4.88	12.20	17.5	15.47	40.55	17.5	47.03	63.47	17.6	17.71	15.92	17.6	32.77	6.48
18.4	4.85	12.54	18.5	15.30	40.82	18.5	47.08	63.84	18.5	17.72	16.22	18.6	32.87	6.76
19.4	4.82	12.91	19.5	15.14	41.11	19.5	47.11	64.20	19.5	17.75	16.51	19.6	32.97	7.05
20.4	4.78	13.25	20.5	15.00	41.37	20.5	47.12	64.54	20.5	17.78	16.81	20.6	33.06	7.34
21.4	4.73	13.58	21.5	14.86	41.64	21.5	47.13	64.89	21.5	17.81	17.10	21.6	33.14	7.65
22.4	4.66	13.91	22.5	14.72	41.93	22.5	47.14	65.23	22.5	17.84	17.41	22.6	33.20	7.93
23.4	4.60	14.19	23.5	14.57	42.24	23.5	47.13	65.54	23.5	17.87	17.73	23.6	33.26	8.21
24.4	4.54	14.47	24.5	14.39	42.55	24.5	47.13	65.83	24.5	17.88	18.07	24.5	33.32	8.47
25.4	4.49	14.73	25.5	14.18	42.87	25.5	47.13	66.12	25.5	17.90	18.44	25.5	33.39	8.72
26.4	4.45	15.00	26.4	13.93	43.19	26.5	47.14	66.42	26.5	17.91	18.81	26.5	33.45	8.96
27.4	4.42	15.28	27.4	13.65	43.49	27.5	47.18	66.71	27.5	17.91	19.18	27.5	33.54	9.18
28.4	4.39	15.58	28.4	13.33	43.78	28.5	47.21	67.02	28.5	17.90	19.55	28.5	33.63	9.44
29.4	4.36	15.89	29.4	13.01	44.03	29.5	47.25	67.35	29.5	17.89	19.88	29.5	33.71	9.70
30.4	4.33	16.23	30.4	12.71	44.27	30.5	47.27	67.69	30.5	17.87	20.20	30.5	33.81	9.97
31.4	4.29	16.58	31.4	12.42	44.50	31.5	47.28	68.03	31.5	17.85	20.49	31.5	33.90	10.28
32.4	4.22	16.91	32.4	12.17	44.73	32.4	47.28	68.40	32.5	17.83	20.78	32.5	33.97	10.61
8.58		−8.52	23.34		+23.32	9.90		−9.85	7.34		+7.27	6.24		−6.16
14^h	13^m	$46^s.350$	15^h	3^m	$2^s.510$	15^h	24^m	$23^s.351$	16^h	54^m	$12^s.991$	17^h	16^m	$17^s.234$
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.27

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
May	17 58	+86 36	May	18 8	−87 39	May	19 0	+89 1	May	19 32	−89 12	May	20 48	+82 18
	s	″		s	″		s	″		s	″		s	″
1.6	25.41	40.31	1.6	6.44	32.35	1.7	10.03	2.41	1.7	14.86	46.82	1.8	31.02	47.81
2.6	25.60	40.56	2.6	7.04	32.51	2.7	10.92	2.61	2.7	16.79	46.85	2.8	31.17	47.90
3.6	25.80	40.79	3.6	7.64	32.69	3.7	11.76	2.79	3.7	18.75	46.89	3.8	31.32	47.96
4.6	25.99	41.01	4.6	8.21	32.88	4.7	12.63	2.96	4.7	20.67	46.95	4.7	31.46	48.03
5.6	26.21	41.22	5.6	8.75	33.11	5.7	13.51	3.11	5.7	22.53	47.03	5.7	31.60	48.08
6.6	26.43	41.44	6.6	9.24	33.34	6.7	14.46	3.26	6.7	24.29	47.13	6.7	31.75	48.12
7.6	26.67	41.68	7.6	9.70	33.56	7.7	15.46	3.43	7.7	25.95	47.24	7.7	31.90	48.16
8.6	26.91	41.93	8.6	10.13	33.78	8.7	16.51	3.61	8.7	27.51	47.35	8.7	32.07	48.21
9.6	27.15	42.20	9.6	10.55	33.98	9.7	17.58	3.79	9.7	29.01	47.45	9.7	32.24	48.25
10.6	27.39	42.47	10.6	10.96	34.16	10.7	18.63	4.01	10.7	30.47	47.55	10.7	32.41	48.34
11.6	27.61	42.76	11.6	11.37	34.34	11.7	19.67	4.24	11.7	31.95	47.63	11.7	32.58	48.44
12.6	27.81	43.07	12.6	11.80	34.52	12.7	20.65	4.48	12.7	33.44	47.71	12.7	32.75	48.56
13.6	28.01	43.38	13.6	12.26	34.69	13.6	21.57	4.72	13.7	34.97	47.79	13.7	32.93	48.69
14.6	28.18	43.69	14.6	12.71	34.87	14.6	22.44	4.97	14.7	36.56	47.85	14.7	33.08	48.84
15.6	28.33	44.01	15.6	13.17	35.06	15.6	23.25	5.24	15.7	38.19	47.93	15.7	33.24	48.99
16.6	28.48	44.30	16.6	13.65	35.28	16.6	24.01	5.50	16.7	39.86	48.02	16.7	33.39	49.15
17.6	28.62	44.60	17.6	14.12	35.51	17.6	24.72	5.75	17.7	41.56	48.12	17.7	33.54	49.29
18.6	28.75	44.89	18.6	14.59	35.75	18.6	25.41	5.99	18.7	43.27	48.26	18.7	33.69	49.44
19.6	28.88	45.16	19.6	15.05	36.00	19.6	26.08	6.23	19.7	44.96	48.40	19.7	33.82	49.58
20.6	29.01	45.43	20.6	15.47	36.26	20.6	26.77	6.46	20.7	46.58	48.56	20.7	33.96	49.71
21.6	29.15	45.69	21.6	15.85	36.53	21.6	27.50	6.68	21.6	48.12	48.72	21.7	34.09	49.84
22.6	29.30	45.97	22.6	16.20	36.78	22.6	28.27	6.91	22.6	49.58	48.88	22.7	34.23	49.95
23.6	29.45	46.25	23.6	16.54	37.03	23.6	29.07	7.14	23.6	50.95	49.04	23.7	34.38	50.09
24.6	29.60	46.56	24.8	16.86	37.27	24.6	29.88	7.40	24.6	52.26	49.19	24.7	34.53	50.27
25.6	29.73	46.89	25.6	17.19	37.50	25.6	30.65	7.68	25.6	53.54	49.33	25.7	34.70	50.44
26.6	29.85	47.24	26.6	17.54	37.71	26.6	31.37	8.00	26.6	54.86	49.47	26.7	34.85	50.66
27.6	29.95	47.61	27.6	17.91	37.91	27.6	32.00	8.33	27.6	56.25	49.60	27.7	35.00	50.89
28.6	30.01	47.96	28.6	18.31	38.14	28.6	32.53	8.64	28.6	57.73	49.73	28.7	35.15	51.13
29.6	30.06	48.30	29.6	18.72	38.38	29.6	32.97	8.96	29.6	59.29	49.86	29.7	35.29	51.37
30.6	30.09	48.63	30.6	19.14	38.64	30.6	33.39	9.26	30.6	60.88	50.01	30.7	35.41	51.61
31.6	30.12	48.93	31.6	19.54	38.91	31.6	33.76	9.54	31.6	62.47	50.19	31.7	35.54	51.82
32.6	30.15	49.22	32.6	19.92	39.21	32.6	34.14	9.81	32.6	63.99	50.39	32.7	35.64	52.02
16.92	+16.89		24.49	−24.47		58.36	+58.35		72.83	−72.83		7.40	+7.33	
17^h	58^m	$22^s.311$	18^h	7^m	$23^s.343$	19^h	0^m	$15^s.079$	19^h	30^m	$50^s.769$	20^h	48^m	$32^s.146$
+86°	36′	51″.04	−87°	39′	50″.89	+89°	1′	12″.80	−89°	13′	13″.35	+82°	13′	56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
May	21 38	−83 5	May	22 16	−86 22	May	22 37	−81 47	May	23 27	+86 51	May	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
1.8	40.64	3.69	1.8	30.00	20.18	1.8	49.92	55.28	1.9	33.19	35.88	1.9	17.17	42.46
2.8	40.84	3.50	2.8	30.33	19.94	2.8	50.07	54.99	2.9	33.53	35.75	2.9	17.30	42.10
3.8	41.07	3.31	3.8	30.70	19.71	3.8	50.23	54.71	3.9	33.85	35.62	3.9	17.42	41.76
4.8	41.29	3.16	4.8	31.08	19.50	4.8	50.39	54.47	4.9	34.13	35.49	4.9	17.55	41.43
5.8	41.49	3.03	5.8	31.45	19.31	5.8	50.55	54.24	5.9	34.44	35.36	5.9	17.69	41.12
6.8	41.70	2.93	6.8	31.83	19.15	6.8	50.71	54.04	6.9	34.74	35.21	6.9	17.82	40.84
7.8	41.90	2.83	7.8	32.17	19.00	7.8	50.86	53.87	7.9	35.05	35.04	7.9	17.95	40.57
8.8	42.08	2.73	8.8	32.50	18.87	8.8	51.00	53.70	8.8	35.38	34.87	8.9	18.08	40.32
9.8	42.27	2.65	9.8	32.82	18.74	9.8	51.14	53.53	9.8	35.73	34.70	9.9	18.21	40.06
10.8	42.44	2.55	10.8	33.13	18.60	10.8	51.28	53.36	10.8	36.10	34.55	10.9	18.31	39.83
11.8	42.61	2.45	11.8	33.43	18.45	11.8	51.40	53.17	11.8	36.49	34.40	11.9	18.41	39.60
12.8	42.78	2.35	12.8	33.73	18.31	12.8	51.53	52.99	12.8	36.90	34.28	12.9	18.52	39.34
13.8	42.95	2.24	13.8	34.03	18.15	13.8	51.66	52.80	13.8	37.31	34.17	13.8	18.64	39.07
14.8	43.14	2.12	14.8	34.35	17.98	14.8	51.80	52.61	14.8	37.71	34.07	14.8	18.76	38.80
15.8	43.34	2.01	15.8	34.68	17.82	15.8	51.94	52.41	15.8	38.10	33.99	15.8	18.88	38.53
16.8	43.53	1.89	16.8	35.04	17.67	16.8	52.12	52.21	16.8	38.48	33.91	16.8	19.02	38.25
17.7	43.74	1.79	17.8	35.40	17.52	17.8	52.28	52.03	17.8	38.85	33.86	17.8	19.15	37.97
18.7	43.96	1.70	18.8	35.78	17.38	18.8	52.44	51.86	18.8	39.21	33.81	18.8	19.30	37.71
19.7	44.18	1.64	19.8	36.17	17.25	19.8	52.62	51.69	19.8	39.55	33.75	19.8	19.46	37.44
20.7	44.39	1.58	20.8	36.56	17.15	20.8	52.79	51.55	20.8	39.89	33.67	20.8	19.62	37.21
21.7	44.60	1.55	21.8	36.94	17.07	21.8	52.96	51.43	21.8	40.23	33.59	21.8	19.78	36.99
22.7	44.79	1.55	22.8	37.31	17.01	22.8	53.11	51.33	22.8	40.60	33.51	22.8	19.93	36.80
23.7	44.98	1.54	23.8	37.64	16.94	23.8	53.26	51.23	23.8	40.96	33.42	23.8	20.08	36.61
24.7	45.15	1.50	24.8	37.97	16.86	24.8	53.41	51.13	24.8	41.37	33.36	24.8	20.21	36.42
25.7	45.33	1.47	25.8	38.29	16.78	25.8	53.54	51.01	25.8	41.79	33.30	25.8	20.34	36.23
26.7	45.50	1.43	26.8	38.59	16.69	26.8	53.68	50.88	26.8	42.24	33.25	26.8	20.47	36.03
27.7	45.68	1.35	27.7	38.90	16.59	27.8	53.82	50.74	27.8	42.68	33.24	27.8	20.60	35.81
28.7	45.87	1.28	28.7	39.24	16.49	28.8	53.98	50.60	28.8	43.11	33.26	28.8	20.74	35.58
29.7	46.07	1.22	29.7	39.61	16.38	29.8	54.15	50.44	29.8	43.54	33.28	29.8	20.88	35.35
30.7	46.30	1.16	30.7	39.99	16.28	30.8	54.33	50.30	30.8	43.93	33.30	30.8	21.05	35.12
31.7	46.52	1.14	31.7	40.39	16.19	31.8	54.51	50.17	31.8	44.29	33.33	31.8	21.22	34.90
32.7	46.74	1.14	32.7	40.78	16.13	32.7	54.69	50.08	32.8	44.65	33.36	32.8	21.40	34.71
8.30	−8.24		15.80	−15.77		7.01	−6.94		18.25	+18.23		7.62	−7.56	
21ʰ 38ᵐ 38ˢ.548			22ʰ 16ᵐ 33ˢ.212			22ʰ 37ᵐ 51ˢ.624			23ʰ 27ᵐ 43ˢ.571			23ʰ 47ᵐ 23ˢ.637		
−83° 5′ 34″.33			−86° 22′ 50″.92			−81° 48′ 24″.80			+86° 51′ 38″.62			−82° 28′ 8″.42		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
June	0 57	+85 49	June	1 31	+88 52	June	1 41	−85 10	June	4 10	+85 20	June	5 35	+85 9
	s	″		s	″		s	″		s	″		s	″
0.8	24.01	19.69	0.9	1.50	16.68	0.9	37.83	19.90	0.9	35.68	28.09	1.0	48.46	35.58
1.8	24.26	19.60	1.9	2.34	16.55	1.9	38.01	19.58	1.9	35.78	27.85	2.0	48.47	35.32
2.8	24.50	19.49	2.9	3.15	16.41	2.9	38.19	19.26	2.9	35.86	27.60	3.0	48.46	35.05
3.8	24.74	19.38	3.9	3.97	16.24	3.9	38.39	18.98	3.9	35.94	27.33	4.0	48.45	34.78
4.8	25.00	19.25	4.9	4.80	16.07	4.9	38.55	18.73	4.9	36.01	27.05	5.0	48.43	34.47
5.8	25.27	19.13	5.9	5.72	15.91	5.9	38.72	18.48	5.9	36.09	26.76	6.0	48.41	34.16
6.8	25.55	19.00	6.9	6.67	15.73	6.9	38.88	18.25	6.9	36.17	26.45	7.0	48.40	33.86
7.8	25.85	18.89	7.9	7.68	15.55	7.9	39.03	18.01	7.9	36.27	26.14	8.0	48.40	33.52
8.8	26.16	18.78	8.9	8.74	15.40	8.9	39.18	17.78	8.9	36.39	25.82	9.0	48.41	33.18
9.8	26.48	18.68	9.8	9.84	15.25	9.9	39.34	17.55	9.9	36.53	25.50	10.0	48.45	32.83
10.8	26.81	18.61	10.8	10.96	15.12	10.9	39.49	17.30	10.9	36.67	25.21	11.0	48.49	32.50
11.8	27.13	18.55	11.8	12.07	15.00	11.8	39.66	17.05	11.9	36.83	24.93	12.0	48.55	32.17
12.8	27.45	18.51	12.8	13.17	14.91	12.8	39.83	16.78	12.9	36.99	24.67	13.0	48.62	31.86
13.8	27.77	18.48	13.8	14.25	14.82	13.8	40.00	16.52	13.9	37.16	24.42	14.0	48.70	31.56
14.8	28.06	18.47	14.8	15.29	14.76	14.8	40.18	16.26	14.9	37.33	24.18	15.0	48.79	31.28
15.8	28.34	18.46	15.8	16.28	14.69	15.8	40.38	16.01	15.9	37.49	23.96	16.0	48.85	30.99
16.8	28.62	18.45	16.8	17.25	14.61	16.8	40.60	15.76	16.9	37.64	23.73	16.9	48.92	30.73
17.8	28.89	18.42	17.8	18.19	14.53	17.8	40.83	15.53	17.9	37.79	23.51	17.9	48.98	30.46
18.8	29.17	18.37	18.8	19.14	14.45	18.8	41.05	15.33	18.9	37.92	23.27	18.9	49.04	30.19
19.8	29.44	18.32	19.8	20.13	14.35	19.8	41.27	15.12	19.9	38.05	23.02	19.9	49.08	29.91
20.8	29.75	18.28	20.8	21.17	14.25	20.8	41.47	14.94	20.9	38.20	22.76	20.9	49.13	29.59
21.8	30.06	18.24	21.8	22.29	14.15	21.8	41.67	14.78	21.9	38.37	22.48	21.9	49.19	29.28
22.8	30.39	18.22	22.8	23.49	14.06	22.8	41.85	14.61	22.9	38.55	22.20	22.9	49.28	28.94
23.8	30.74	18.21	23.8	24.73	14.01	23.8	42.03	14.42	23.9	38.75	21.91	23.9	49.38	28.61
24.8	31.09	18.24	24.8	26.00	13.97	24.8	42.21	14.23	24.9	38.98	21.66	24.9	49.51	28.26
25.8	31.44	18.29	25.8	27.24	13.96	25.8	42.39	14.01	25.9	39.22	21.43	25.9	49.66	27.94
26.8	31.78	18.36	26.8	28.44	13.97	26.8	42.59	13.79	26.9	39.46	21.24	26.9	49.82	27.66
27.8	32.10	18.43	27.8	29.57	14.00	27.8	42.81	13.59	27.9	39.69	21.04	27.9	49.97	27.40
28.8	32.39	18.50	28.8	30.64	14.03	28.8	43.05	13.38	28.9	39.91	20.87	28.9	50.11	27.16
29.8	32.67	18.57	29.8	31.66	14.04	29.8	43.30	13.17	29.9	40.10	20.70	29.9	50.24	26.92
30.8	32.94	18.61	30.8	32.65	14.04	30.8	43.55	13.00	30.9	40.29	20.51	30.9	50.35	26.66
31.8	33.22	18.64	31.8	33.66	14.01	31.8	43.80	12.85	31.9	40.48	20.32	31.9	50.46	26.39
	13.72	+13.69		50.74	+50.73		11.88	−11.84		12.31	+12.27		11.85	+11.81
	0h 57m 24s.633			1h 31m 11s.709			1h 41m 54s.846			4h 10m 37s.831			5h 35m 50s.330	
	+85° 49′ 24″.14			+88° 52′ 20″.55			−85° 10′ 45″.22			+85° 20′ 28″.88			+85° 9′ 34″.51	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
June	5 45	−84 49	June	6 46	−80 43	June	7 2	+87 10	June	7 14	+82 34	June	7 15	−86 54
	s	″		s	″		s	″		s	″		s	″
1.0	28.33	53.19	1.1	38.21	63.83	1.1	58.73	46.83	1.1	7.95	20.16	1.1	6.94	41.00
2.0	28.22	52.85	2.1	38.12	63.55	2.1	58.60	46.59	2.1	7.91	19.93	2.1	6.60	40.76
3.0	28.12	52.51	3.1	38.04	63.26	3.1	58.44	46.34	3.1	7.85	19.71	3.1	6.30	40.50
4.0	28.04	52.17	4.1	37.96	62.97	4.1	58.27	46.09	4.1	7.77	19.48	4.1	6.01	40.25
5.0	27.96	51.86	5.1	37.90	62.68	5.1	58.09	45.82	5.1	7.69	19.23	5.1	5.74	40.00
6.0	27.90	51.56	6.1	37.83	62.39	6.1	57.89	45.54	6.1	7.62	18.97	6.1	5.49	39.76
7.0	27.83	51.27	7.1	37.76	62.15	7.1	57.70	45.22	7.1	7.54	18.68	7.1	5.25	39.53
8.0	27.76	50.98	8.1	37.70	61.89	8.1	57.52	44.91	8.1	7.48	18.40	8.1	5.01	39.30
9.0	27.69	50.71	9.1	37.64	61.65	9.1	57.37	44.58	9.1	7.41	18.08	9.1	4.77	39.10
10.0	27.60	50.45	10.1	37.57	61.41	10.1	57.24	44.25	10.1	7.36	17.77	10.1	4.52	38.88
11.0	27.53	50.16	11.1	37.50	61.14	11.1	57.13	43.93	11.1	7.31	17.45	11.1	4.27	38.66
12.0	27.45	49.87	12.1	37.44	60.88	12.1	57.04	43.60	12.1	7.28	17.14	12.1	4.00	38.44
13.0	27.37	49.58	13.1	37.37	60.62	13.1	56.99	43.27	13.1	7.27	16.84	13.1	3.74	38.20
14.0	27.29	49.25	14.1	37.30	60.33	14.1	56.95	42.97	14.1	7.26	16.55	14.1	3.47	37.96
15.0	27.23	48.91	15.1	37.23	60.02	15.1	56.92	42.68	15.1	7.25	16.27	15.1	3.21	37.70
16.0	27.17	48.58	16.0	37.17	59.71	16.1	56.89	42.39	16.1	7.23	15.99	16.1	2.96	37.42
17.0	27.12	48.21	17.0	37.12	59.39	17.1	56.85	42.12	17.1	7.21	15.71	17.1	2.72	37.13
18.0	27.09	47.86	18.0	37.06	59.07	18.1	56.81	41.84	18.1	7.18	15.45	18.1	2.49	36.83
18.9	27.06	47.51	19.0	37.01	58.74	19.1	56.73	41.55	19.1	7.15	15.19	19.1	2.30	36.53
19.9	27.05	47.18	20.0	36.97	58.41	20.0	56.64	41.26	20.1	7.13	14.92	20.1	2.12	36.24
20.9	27.04	46.87	21.0	36.94	58.12	21.0	56.56	40.94	21.1	7.08	14.61	21.1	1.97	35.96
21.9	27.03	46.57	22.0	36.91	57.84	22.0	56.50	40.60	22.1	7.05	14.30	22.1	1.82	35.71
22.9	27.02	46.31	23.0	36.87	57.58	23.0	56.45	40.24	23.0	7.04	13.96	23.0	1.65	35.47
23.9	26.98	46.03	24.0	36.83	57.32	24.0	56.44	39.87	24.0	7.03	13.59	24.0	1.48	35.24
24.9	26.94	45.75	25.0	36.79	57.05	25.0	56.48	39.50	25.0	7.04	13.24	25.0	1.30	35.00
25.9	26.91	45.44	26.0	36.75	56.78	26.0	56.54	39.16	26.0	7.07	12.90	26.0	1.10	34.76
26.9	26.88	45.13	27.0	36.71	56.47	27.0	56.63	38.82	27.0	7.10	12.59	27.0	0.89	34.49
27.9	26.87	44.79	28.0	36.67	56.15	28.0	56.72	38.51	28.0	7.14	12.29	28.0	0.69	34.19
28.9	26.85	44.44	29.0	36.63	55.80	29.0	56.80	38.22	29.0	7.18	12.00	29.0	0.49	33.87
29.9	26.86	44.07	30.0	36.59	55.46	30.0	56.86	37.93	30.0	7.19	11.74	30.0	0.34	33.55
30.9	26.88	43.71	31.0	36.58	55.10	31.0	56.90	37.64	31.0	7.20	11.46	31.0	0.20	33.22
31.9	26.91	43.38	32.0	36.57	54.76	32.0	56.93	37.35	32.0	7.21	11.18	32.0	0.10	32.89
	11.10	−11.05		6.21	−6.13		20.32	+20.29		7.73	+7.67		18.55	−18.53
	$5^{h}\ 45^{m}$	$51^{s}.396$		$6^{h}\ 46^{m}$	$48^{s}.653$		$7^{h}\ 3^{m}$	$2^{s}.335$		$7^{h}\ 14^{m}$	$7^{s}.912$		$7^{h}\ 15^{m}$	$39^{s}.691$
	−84° 49′	44″.27		−80° 43′	46″.14		+87° 10′	43″.86		+82° 34′	17″.32		−86° 54′	19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
June	8 17	+88 52	June	9 8	−85 20	June	9 25	+81 41	June	9 36	−80 35	June	10 21	+82 58
	s	″		s	″		s	″		s	″		s	″
1.2	39.39	42.06	1.2	31.50	58.93	1.2	40.68	14.52	1.2	16.78	12.99	1.2	21.90	22.44
2.2	38.78	41.86	2.2	31.22	58.84	2.2	40.58	14.39	2.2	16.64	12.94	2.2	21.77	22.38
3.1	38.13	41.66	3.2	30.94	58.73	3.2	40.47	14.29	3.2	16.50	12.86	3.2	21.62	22.31
4.1	37.43	41.46	4.2	30.69	58.62	4.2	40.37	14.16	4.2	16.37	12.78	4.2	21.48	22.25
5.1	36.67	41.26	5.2	30.44	58.50	5.2	40.24	14.04	5.2	16.25	12.69	5.2	21.32	22.20
6.1	35.88	41.04	6.2	30.19	58.39	6.2	40.11	13.92	6.2	16.13	12.60	6.2	21.15	22.13
7.1	35.09	40.80	7.2	29.97	58.27	7.2	39.96	13.78	7.2	16.02	12.52	7.2	20.98	22.05
8.1	34.32	40.53	8.2	29.76	58.17	8.2	39.85	13.61	8.2	15.91	12.44	8.2	20.80	21.96
9.1	33.57	40.25	9.2	29.53	58.08	9.2	39.72	13.43	9.2	15.81	12.38	9.2	20.62	21.84
10.1	32.89	39.97	10.2	29.31	57.98	10.2	39.62	13.24	10.2	15.70	12.31	10.2	20.46	21.71
11.1	32.26	39.69	11.2	29.09	57.88	11.2	39.50	13.04	11.2	15.59	12.25	11.2	20.31	21.58
12.1	31.69	39.40	12.2	28.87	57.79	12.2	39.40	12.82	12.2	15.48	12.18	12.2	20.16	21.44
13.1	31.18	39.11	13.2	28.63	57.69	13.2	39.30	12.60	13.2	15.37	12.10	13.2	20.01	21.28
14.1	30.72	38.82	14.2	28.38	57.57	14.2	39.21	12.38	14.2	15.24	12.02	14.2	19.88	21.12
15.1	30.29	38.53	15.1	28.13	57.43	15.2	39.13	12.18	15.2	15.12	11.92	15.2	19.75	20.97
16.1	29.88	38.26	16.1	27.88	57.28	16.2	39.05	11.98	16.2	15.00	11.79	16.2	19.63	20.83
17.1	29.46	38.01	17.1	27.64	57.12	17.2	38.97	11.79	17.2	14.87	11.66	17.2	19.51	20.69
18.1	29.01	37.76	18.1	27.39	56.93	18.2	38.89	11.61	18.2	14.75	11.51	18.2	19.39	20.56
19.1	28.52	37.51	19.1	27.16	56.75	19.2	38.80	11.43	19.2	14.64	11.33	19.2	19.25	20.43
20.1	27.98	37.24	20.1	26.97	56.56	20.1	38.70	11.24	20.2	14.53	11.18	20.2	19.12	20.31
21.1	27.42	36.96	21.1	26.76	56.38	21.1	38.59	11.02	21.2	14.43	11.03	21.2	18.96	20.17
22.1	26.88	36.64	22.1	26.58	56.20	22.1	38.48	10.80	22.1	14.33	10.88	22.2	18.80	20.00
23.1	26.37	36.33	23.1	26.40	56.06	23.1	38.38	10.56	23.1	14.24	10.74	23.2	18.65	19.81
24.1	25.93	35.97	24.1	26.22	55.93	24.1	38.28	10.28	24.1	14.15	10.63	24.2	18.50	19.58
25.1	25.59	35.61	25.1	26.02	55.81	25.1	38.20	10.01	25.1	14.06	10.52	25.2	18.36	19.36
26.1	25.34	35.26	26.1	25.82	55.67	26.1	38.14	9.71	26.1	13.96	10.40	26.2	18.25	19.13
27.1	25.16	34.93	27.1	25.60	55.50	27.1	38.09	9.42	27.1	13.86	10.27	27.2	18.15	18.89
28.1	25.01	34.61	28.1	25.37	55.33	28.1	38.04	9.15	28.1	13.75	10.12	28.2	18.06	18.65
29.1	24.86	34.33	29.1	25.15	55.13	29.1	37.99	8.91	29.1	13.63	9.94	29.2	17.97	18.44
30.1	24.68	34.04	30.1	24.94	54.90	30.1	37.94	8.67	30.1	13.53	9.74	30.2	17.87	18.24
31.1	24.45	33.76	31.1	24.74	54.65	31.1	37.88	8.44	31.1	13.42	9.51	31.2	17.76	18.04
32.1	24.17	33.48	32.1	24.56	54.41	32.1	37.81	8.21	32.1	13.32	9.28	32.2	17.63	17.85
	51.04	+51.03		12.33	−12.29		6.92	+6.84		6.11	−6.03		8.17	+8.11
	8^h 17^m	$47^s.546$		9^h 8^m	$41^s.594$		9^h 25^m	$39^s.275$		9^h 36^m	$19^s.026$		10^h 21^m	$19^s.949$
	+88° 52′	37″.80		−85° 20′	26″.78		+81° 41′	10″.13		−80° 34′	39″.26		+82° 58′	17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. *seq.* Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
June	10 59	−84 10	June	12 14	+88 9	June	12 46	−84 41	June	12 48	+83 51	June	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
1.3	57.84	4.78	1.3	35.71	0.95	1.3	33.78	32.54	1.3	35.27	15.37	1.4	53.67	46.86
2.3	57.62	4.86	2.3	35.16	1.01	2.3	33.60	32.77	2.3	35.12	15.48	2.4	53.50	47.15
3.3	57.40	4.92	3.3	34.61	1.10	3.3	33.41	32.97	3.3	34.97	15.61	3.4	53.32	47.40
4.3	57.18	4.97	4.3	34.03	1.18	4.3	33.22	33.17	4.3	34.80	15.74	4.4	53.13	47.64
5.3	56.98	5.01	5.3	33.42	1.27	5.3	33.03	33.35	5.3	34.63	15.87	5.4	52.94	47.84
6.3	56.79	5.03	6.3	32.77	1.36	6.3	32.85	33.50	6.3	34.45	16.01	6.4	52.76	48.05
7.2	56.60	5.06	7.3	32.08	1.42	7.3	32.68	33.65	7.3	34.25	16.15	7.4	52.61	48.25
8.2	56.41	5.09	8.3	31.38	1.49	8.3	32.52	33.80	8.3	34.05	16.28	8.3	52.45	48.44
9.2	56.24	5.13	9.3	30.66	1.53	9.3	32.36	33.97	9.3	33.85	16.39	9.3	52.29	48.64
10.2	56.06	5.18	10.3	29.95	1.55	10.3	32.21	34.14	10.3	33.64	16.47	10.3	52.15	48.86
11.2	55.88	5.22	11.3	29.24	1.56	11.3	32.06	34.31	11.3	33.45	16.53	11.3	52.00	49.08
12.2	55.69	5.26	12.3	28.55	1.57	12.3	31.89	34.49	12.3	33.25	16.59	12.3	51.84	49.30
13.2	55.51	5.31	13.3	27.88	1.56	13.3	31.72	34.67	13.3	33.05	16.65	13.3	51.67	49.53
14.2	55.31	5.36	14.3	27.24	1.53	14.3	31.54	34.86	14.3	32.87	16.69	14.3	51.50	49.76
15.2	55.10	5.39	15.3	26.63	1.50	15.3	31.36	35.04	15.3	32.69	16.71	15.3	51.31	49.99
16.2	54.88	5.40	16.3	26.03	1.48	16.3	31.15	35.20	16.3	32.52	16.74	16.3	51.09	50.21
17.2	54.65	5.40	17.3	25.44	1.47	17.3	30.93	35.35	17.3	32.35	16.78	17.3	50.87	50.41
18.2	54.45	5.37	18.3	24.85	1.47	18.3	30.71	35.48	18.3	32.18	16.83	18.3	50.65	50.60
19.2	54.24	5.33	19.3	24.25	1.47	19.3	30.49	35.59	19.3	32.00	16.88	19.3	50.43	50.76
20.2	54.03	5.28	20.3	23.61	1.47	20.3	30.29	35.69	20.3	31.82	16.93	20.3	50.20	50.91
21.2	53.84	5.23	21.3	22.93	1.47	21.3	30.10	35.78	21.3	31.62	16.98	21.3	50.00	51.05
22.2	53.66	5.18	22.3	22.20	1.43	22.3	29.92	35.86	22.3	31.39	17.04	22.3	49.81	51.17
23.2	53.49	5.15	23.3	21.46	1.39	23.3	29.75	35.95	23.3	31.19	17.06	23.3	49.63	51.31
24.2	53.33	5.14	24.3	20.72	1.32	24.3	29.59	36.05	24.3	30.97	17.06	24.3	49.47	51.46
25.2	53.16	5.14	25.3	20.00	1.23	25.3	29.42	36.18	25.3	30.76	17.03	25.3	49.30	51.63
26.2	52.98	5.14	26.2	19.32	1.12	26.3	29.25	36.32	26.3	30.56	16.98	26.3	49.12	51.81
27.2	52.79	5.13	27.2	18.67	0.99	27.3	29.06	36.46	27.3	30.37	16.93	27.3	48.93	51.99
28.2	52.59	5.10	28.2	18.07	0.88	28.3	28.84	36.58	28.3	30.19	16.87	28.3	48.71	52.17
29.2	52.37	5.04	29.2	17.51	0.78	29.3	28.62	36.69	29.3	30.01	16.81	29.3	48.48	52.33
30.2	52.15	4.96	30.2	16.95	0.70	30.3	28.38	36.76	30.3	29.84	16.77	30.3	48.23	52.47
31.2	51.95	4.87	31.2	16.36	0.62	31.3	28.15	36.82	31.3	29.67	16.76	31.3	47.97	52.58
32.2	51.76	4.74	32.2	15.77	0.56	32.3	27.93	36.86	32.3	29.48	16.74	32.3	47.72	52.69
9.84	−9.79		30.98	+30.97		10.81	−10.77		9.34	+9.29		12.42	−12.38	
10^h	59^m	$54^s.546$	12^h	14^m	$29^s.190$	12^h	46^m	$19^s.119$	12^h	48^m	$31^s.308$	13^h	27^m	$32^s.891$
−84°	9′	29″.33	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
June	17 58	+86 36	June	18 8	−87 39	June	19 0	+89 1	June	19 33	−89 12	June	20 48	+82 13
	s	″		s	″		s	″		s	″		s	″
1.6	30.15	49.22	1.6	19.92	39.21	1.6	34.14	9.81	1.6	3.99	50.39	1.7	35.64	52.02
2.6	30.20	49.50	2.6	20.24	39.51	2.6	34.59	10.08	2.6	5.43	50.60	2.7	35.77	52.22
3.6	30.27	49.78	3.6	20.52	39.81	3.6	35.08	10.34	3.6	6.74	50.82	3.7	35.89	52.40
4.5	30.35	50.08	4.6	20.77	40.11	4.6	35.60	10.60	4.6	7.94	51.04	4.7	36.01	52.60
5.5	30.42	50.40	5.6	21.00	40.39	5.6	36.16	10.88	5.6	9.06	51.27	5.7	36.13	52.81
6.5	30.48	50.74	6.5	21.20	40.65	6.6	36.73	11.17	6.6	10.12	51.49	6.7	36.27	53.03
7.5	30.54	51.08	7.5	21.42	40.92	7.6	37.26	11.49	7.6	11.15	51.69	7.7	36.41	53.25
8.5	30.59	51.45	8.5	21.64	41.17	8.6	37.75	11.82	8.6	12.20	51.88	8.7	36.54	53.52
9.5	30.61	51.81	9.5	21.86	41.41	9.6	38.18	12.16	9.6	13.27	52.06	9.7	36.67	53.79
10.5	30.62	52.15	10.5	22.10	41.66	10.6	38.53	12.50	10.6	14.39	52.25	10.6	36.80	54.06
11.5	30.62	52.50	11.5	22.35	41.93	11.6	38.84	12.84	11.6	15.54	52.44	11.6	36.91	54.34
12.5	30.59	52.85	12.5	22.62	42.20	12.6	39.07	13.18	12.6	16.72	52.64	12.6	37.02	54.62
13.5	30.55	53.19	13.5	22.89	42.48	13.6	39.26	13.51	13.6	17.93	52.86	13.6	37.13	54.90
14.5	30.51	53.51	14.5	23.14	42.79	14.6	39.40	13.83	14.6	19.15	53.09	14.6	37.23	55.19
15.5	30.47	53.82	15.5	23.38	43.10	15.6	39.53	14.13	15.6	20.34	53.33	15.6	37.33	55.47
16.5	30.42	54.11	16.5	23.58	43.42	16.6	39.67	14.42	16.6	21.49	53.59	16.6	37.41	55.73
17.5	30.38	54.39	17.5	23.76	43.75	17.6	39.83	14.70	17.6	22.55	53.86	17.6	37.51	55.98
18.5	30.37	54.70	18.5	23.91	44.07	18.6	40.02	14.98	18.6	23.51	54.14	18.6	37.60	56.22
19.5	30.34	55.01	19.5	24.02	44.38	19.5	40.24	15.27	19.6	24.38	54.41	19.6	37.70	56.48
20.5	30.31	55.33	20.5	24.12	44.67	20.5	40.48	15.59	20.6	25.16	54.65	20.6	37.80	56.76
21.5	30.28	55.69	21.5	24.21	44.96	21.5	40.73	15.93	21.6	25.89	54.90	21.6	37.91	57.05
22.5	30.23	56.05	22.5	24.30	45.23	22.5	40.91	16.29	22.6	26.62	55.14	22.6	38.02	57.36
23.5	30.15	56.42	23.5	24.43	45.49	23.5	41.01	16.66	23.6	27.40	55.34	23.6	38.12	57.68
24.5	30.06	56.79	24.5	24.57	45.76	24.5	41.01	17.03	24.6	28.27	55.56	24.6	38.21	58.02
25.5	29.93	57.13	25.5	24.75	46.03	25.5	40.92	17.40	25.6	29.22	55.78	25.6	38.30	58.39
26.5	29.80	57.47	26.5	24.93	46.31	26.5	40.75	17.74	26.6	30.21	56.02	26.6	38.38	58.74
27.5	29.66	57.77	27.5	25.09	46.62	27.5	40.55	18.07	27.5	31.21	56.29	27.6	38.44	59.08
28.5	29.51	58.05	28.5	25.24	46.95	28.5	40.34	18.40	28.5	32.17	56.57	28.6	38.50	59.41
29.5	29.38	58.33	29.5	25.34	47.29	29.5	40.15	18.71	29.5	33.04	56.85	29.6	38.55	59.70
30.5	29.27	58.61	30.5	25.40	47.61	30.5	40.03	19.01	30.5	33.79	57.16	30.6	38.62	59.99
31.5	29.17	58.90	31.5	25.41	47.95	31.5	39.96	19.31	31.5	34.42	57.48	31.6	38.68	60.28
32.5	29.07	59.21	32.5	25.40	48.27	32.5	39.91	19.63	32.5	34.94	57.78	32.6	38.74	60.57

δ Ursæ Minoris	χ Octantis	λ Ursæ Minoris	σ Octantis	76 Draconis
16.94 +16.91	24.51 −24.49	58.50 +58.49	72.97 −72.97	7.40 +7.33
$17^h\ 58^m\ 22^s.311$	$18^h\ 7^m\ 23^s.343$	$19^h\ 0^m\ 15^s.079$	$19^h\ 30^m\ 50^s.769$	$20^h\ 48^m\ 32^s.146$
+86° 36′ 51″.04	−87° 39′ 50″.89	+89° 1′ 12″.80	−89° 13′ 13″.35	+82° 13′ 56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ¹ Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
June	21 38	−83 5	June	22 16	−86 22	June	22 37	−81 47	June	23 27	+86 51	June	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
1.7	46.74	1.14	1.7	40.78	16.13	1.7	54.69	50.08	1.8	44.65	33.36	1.8	21.40	34.71
2.7	46.94	1.16	2.7	41.18	16.09	2.7	54.87	50.00	2.8	45.00	33.37	2.8	21.57	34.52
3.7	47.14	1.19	3.7	41.56	16.09	3.7	55.04	49.95	3.8	45.35	33.38	3.8	21.75	34.37
4.7	47.33	1.24	4.7	41.93	16.10	4.7	55.21	49.90	4.8	45.71	33.36	4.8	21.92	34.23
5.7	47.51	1.30	5.7	42.26	16.11	5.7	55.35	49.88	5.8	46.11	33.35	5.8	22.06	34.10
6.7	47.68	1.34	6.7	42.58	16.12	6.7	55.49	49.84	6.8	46.52	33.34	6.8	22.21	33.99
7.7	47.84	1.39	7.7	42.90	16.12	7.7	55.63	49.80	7.8	46.94	33.34	7.8	22.35	33.87
8.7	48.00	1.43	8.7	43.21	16.12	8.7	55.77	49.76	8.8	47.38	33.38	8.8	22.49	33.75
9.7	48.17	1.45	9.7	43.51	16.10	9.7	55.91	49.72	9.8	47.80	33.41	9.8	22.63	33.61
10.7	48.34	1.47	10.7	43.83	16.10	10.7	56.06	49.67	10.8	48.24	33.46	10.8	22.79	33.48
11.7	48.52	1.50	11.7	44.16	16.08	11.7	56.21	49.62	11.8	48.67	33.55	11.8	22.94	33.34
12.7	48.70	1.54	12.7	44.51	16.06	12.7	56.38	49.56	12.8	49.09	33.64	12.8	23.11	33.20
13.7	48.89	1.58	13.7	44.87	16.05	13.7	56.55	49.52	13.8	49.47	33.73	13.8	23.27	33.05
14.7	49.09	1.62	14.7	45.24	16.05	14.7	56.72	49.49	14.7	49.85	33.83	14.8	23.45	32.91
15.7	49.29	1.69	15.7	45.61	16.07	15.7	56.89	49.48	15.7	50.22	33.93	15.8	23.62	32.78
16.7	49.49	1.77	16.7	45.99	16.10	16.7	57.07	49.47	16.7	50.57	34.03	16.8	23.81	32.68
17.7	49.67	1.87	17.7	46.36	16.16	17.7	57.23	49.48	17.7	50.92	34.11	17.8	23.99	32.60
18.7	49.86	1.98	18.7	46.71	16.24	18.7	57.40	49.52	18.7	51.27	34.19	18.8	24.17	32.54
19.7	50.03	2.11	19.7	47.04	16.32	19.7	57.55	49.56	19.7	51.63	34.27	19.7	24.35	32.48
20.7	50.17	2.24	20.7	47.36	16.41	20.7	57.69	49.62	20.7	52.03	34.35	20.7	24.50	32.44
21.7	50.32	2.35	21.7	47.64	16.48	21.7	57.84	49.65	21.7	52.44	34.43	21.7	24.65	32.39
22.7	50.46	2.46	22.7	47.93	16.54	22.7	57.97	49.66	22.7	52.86	34.54	22.7	24.80	32.34
23.6	50.61	2.55	23.7	48.22	16.60	23.7	58.10	49.68	23.7	53.29	34.67	23.7	24.94	32.28
24.6	50.78	2.62	34.7	48.54	16.65	24.7	58.25	49.69	24.7	53.72	34.83	24.7	25.09	32.20
25.6	50.95	2.69	25.7	48.85	16.69	25.7	58.39	49.68	25.7	54.14	35.01	25.7	25.26	32.11
26.6	51.13	2.76	26.7	49.18	16.73	26.7	58.56	49.68	26.7	54.52	35.20	26.7	25.43	32.02
27.6	51.31	2.86	27.7	49.55	16.80	27.7	58.73	49.70	27.7	54.86	35.39	27.7	25.61	31.93
28.6	51.50	3.00	28.7	49.91	16.88	28.7	58.91	49.74	28.7	55.19	35.57	28.7	25.79	31.87
29.6	51.68	3.13	29.7	50.27	16.97	29.7	59.08	49.80	29.7	55.52	35.74	29.7	25.99	31.83
30.6	51.86	3.30	30.7	50.61	17.09	30.7	59.22	49.89	30.7	55.84	35.88	30.7	26.18	31.82
31.6	52.01	3.49	31.7	50.93	17.22	31.7	59.38	50.01	31.7	56.16	36.02	31.7	26.35	31.82
32.6	52.15	3.69	32.6	51.23	17.37	32.7	59.53	50.12	32.7	56.50	36.16	32.7	26.52	31.86
8.30	−8.24		15.80	−15.77		7.01	−6.94		18.25	+18.23		7.62	−7.55	
21ʰ	38ᵐ	38ˢ.548	22ʰ	16ᵐ	33ˢ.212	22ʰ	37ᵐ	51ˢ.624	23ʰ	27ᵐ	43ˢ.571	23ʰ	47ᵐ	23ˢ.637
−83°	5′	34″.33	−86°	22′	50″.92	−81°	48′	24″.80	+86°	51′	38″.62	−82°	28′	8″.42

5934°—1919——18

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
ly	5 45	−84 49	July	6 46	−80 43	July	7 2	+87 10	July	7 14	+82 34	July	7 14	−86 54
	s	″		s	″		s	″		s	″		s	″
.9	26.88	43.71	1.0	36.58	55.10	1.0	56.90	37.64	1.0	7.20	11.46	1.0	60.20	33.22
.9	26.91	43.38	2.0	36.57	54.76	2.0	56.93	37.35	2.0	7.21	11.18	2.0	60.10	32.89
.9	26.95	43.06	3.0	36.55	54.43	3.0	56.94	37.04	3.0	7.22	10.87	3.0	60.01	32.59
.9	26.99	42.74	4.0	36.55	54.11	4.0	56.95	36.73	4.0	7.21	10.56	4.0	59.95	32.30
.9	27.04	42.46	4.9	36.54	53.82	5.0	56.99	36.39	5.0	7.22	10.24	5.0	59.89	32.01
.9	27.08	42.17	5.9	36.54	53.52	6.0	57.02	36.05	6.0	7.23	9.90	6.0	59.82	31.74
.9	27.13	41.90	6.9	36.54	53.23	7.0	57.10	35.70	7.0	7.25	9.57	7.0	59.76	31.47
.9	27.17	41.61	7.9	36.54	52.94	8.0	57.18	35.35	8.0	7.28	9.22	8.0	59.67	31.19
.9	27.20	41.32	8.9	36.53	52.64	8.9	57.30	35.01	9.0	7.33	8.87	9.0	59.59	30.91
.9	27.24	41.03	9.9	36.53	52.34	9.9	57.43	34.67	10.0	7.38	8.54	10.0	59.50	30.62
.9	27.27	40.71	10.9	36.52	52.03	10.9	57.60	34.33	10.9	7.43	8.23	11.0	59.42	30.33
.9	27.31	40.39	11.9	36.51	51.72	11.9	57.77	34.00	11.9	7.50	7.92	11.9	59.33	30.02
.9	27.36	40.07	12.9	36.51	51.39	12.9	57.94	33.71	12.9	7.57	7.63	12.9	59.25	29.71
.9	27.42	39.74	13.9	36.52	51.03	13.9	58.11	33.42	13.9	7.63	7.35	13.9	59.19	29.38
.9	27.50	39.40	14.9	36.53	50.67	14.9	58.27	33.13	14.9	7.69	7.08	14.9	59.14	29.03
.9	27.58	39.07	15.9	36.54	50.33	15.9	58.42	32.84	15.9	7.74	6.81	15.9	59.12	28.68
.9	27.68	38.75	16.9	36.55	50.00	16.9	58.54	32.55	16.9	7.79	6.52	16.9	59.12	28.35
.9	27.78	38.46	17.9	36.59	49.68	17.9	58.66	32.23	17.9	7.83	6.21	17.9	59.15	28.02
.9	27.89	38.18	18.9	36.62	49.37	18.9	58.79	31.90	18.9	7.87	5.89	18.9	59.18	27.73
.9	27.99	37.94	19.9	36.65	49.08	19.9	58.92	31.56	19.9	7.92	5.55	19.9	59.22	27.44
.9	28.08	37.70	20.9	36.68	48.80	20.9	59.09	31.21	20.9	7.98	5.21	20.9	59.25	27.17
.9	28.16	37.45	21.9	36.70	48.54	21.9	59.31	30.87	21.9	8.07	4.87	21.9	59.26	26.90
.9	28.24	37.19	22.9	36.73	48.27	22.9	59.57	30.53	22.9	8.15	4.53	22.9	59.26	26.64
.9	28.32	36.92	23.9	36.74	47.98	23.9	59.84	30.19	23.9	8.26	4.20	23.9	59.24	26.36
.9	28.40	36.63	24.9	36.76	47.66	24.9	60.13	29.87	24.9	8.38	3.89	24.9	59.23	26.05
.9	28.49	36.31	25.9	36.79	47.33	25.9	60.41	29.58	25.9	8.49	3.61	25.9	59.23	25.73
.9	28.60	35.99	26.9	36.83	46.99	26.9	60.68	29.31	26.9	8.58	3.34	26.9	59.24	25.40
.9	28.73	35.69	27.9	36.87	46.62	27.9	60.92	29.07	27.9	8.68	3.08	27.9	59.29	25.05
.9	28.86	35.40	28.9	36.90	46.28	28.9	61.16	28.80	28.9	8.76	2.82	28.9	59.38	24.71
.9	29.01	35.13	29.9	36.96	45.96	29.9	61.36	28.53	29.9	8.84	2.55	29.9	59.47	24.38
.9	29.16	34.87	30.9	37.02	45.67	30.9	61.57	28.24	30.9	8.91	2.26	30.9	59.58	24.09
.9	29.31	34.64	31.9	37.08	45.38	31.9	61.79	27.93	31.9	8.99	1.97	31.9	59.71	23.79
11.09		−11.05	6.21		−6.13	20.30		+20.27	7.73		+7.67	18.54		−18.51
5^h 45^m $51^s.396$			6^h 46^m $48^s.653$			7^h 3^m $2^s.335$			7^h 14^m $7^s.912$			7^h 15^m $39^s.691$		
84° 49′ 44″.27			−80° 43′ 46″.14			+87° 10′ 43″.86			+82° 34′ 17″.32			−86° 54′ 19″.75		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamaeleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
July	8 17	+88 52	July	9 8	−85 20	July	9 25	+81 40	July	9 36	−80 35	July	10 21	+82 58
	s	″		s	″		s	″		s	″		s	″
1.1	24.45	33.76	1.1	24.74	54.65	1.1	37.88	68.44	1.1	13.42	9.51	1.2	17.76	18.04
2.1	24.17	33.48	2.1	24.56	54.41	2.1	37.81	68.21	2.1	13.32	9.28	2.2	17.63	17.85
3.1	23.85	33.17	3.1	24.39	54.16	3.1	37.73	67.96	3.1	13.23	9.05	3.2	17.51	17.66
4.1	23.52	32.85	4.1	24.24	53.92	4.1	37.65	67.70	4.1	13.14	8.83	4.1	17.37	17.46
5.1	23.20	32.51	5.1	24.09	53.70	5.1	37.57	67.43	5.1	13.06	8.61	5.1	17.24	17.24
6.1	22.91	32.18	6.1	23.96	53.48	6.1	37.48	67.16	6.1	12.99	8.41	6.1	17.12	17.02
7.1	22.68	31.84	7.1	23.81	53.26	7.1	37.42	66.87	7.1	12.91	8.21	7.1	16.99	16.78
8.1	22.49	31.48	8.1	23.67	53.05	8.1	37.36	66.56	8.1	12.85	8.02	8.1	16.89	16.50
9.0	22.37	31.11	9.1	23.53	52.83	9.1	37.30	66.24	9.1	12.77	7.83	9.1	16.78	16.23
10.0	22.31	30.76	10.1	23.38	52.60	10.1	37.25	65.92	10.1	12.69	7.63	10.1	16.68	15.96
11.0	22.31	30.42	11.1	23.21	52.38	11.1	37.21	65.60	11.1	12.61	7.42	11.1	16.59	15.68
12.0	22.35	30.08	12.1	23.04	52.16	12.1	37.20	65.30	12.1	12.52	7.22	12.1	16.51	15.40
13.0	22.41	29.75	13.1	22.88	51.91	13.1	37.17	65.00	13.1	12.43	7.00	13.1	16.45	15.12
14.0	22.48	29.44	14.1	22.72	51.64	14.1	37.13	64.71	14.1	12.35	6.74	14.1	16.37	14.84
15.0	22.54	29.13	15.1	22.57	51.36	15.1	37.10	64.44	15.1	12.27	6.47	15.1	16.29	14.60
16.0	22.55	28.83	16.1	22.43	51.07	16.1	37.08	64.17	16.1	12.19	6.20	16.1	16.21	14.36
17.0	22.51	28.52	17.1	22.30	50.77	17.1	37.03	63.90	17.1	12.11	5.91	17.1	16.13	14.11
18.0	22.46	28.19	18.1	22.20	50.47	18.1	36.98	63.62	18.1	12.05	5.63	18.1	16.06	13.85
19.0	22.39	27.85	19.1	22.11	50.18	19.1	36.93	63.32	19.1	11.99	5.38	19.1	15.94	13.57
20.0	22.34	27.49	20.1	22.03	49.93	20.1	36.88	62.98	20.1	11.95	5.13	20.1	15.83	13.29
21.0	22.35	27.12	21.1	21.94	49.69	21.1	36.85	62.64	21.1	11.90	4.88	21.1	15.73	12.98
22.0	22.46	26.74	22.0	21.85	49.45	22.1	36.81	62.27	22.1	11.85	4.65	22.1	15.65	12.65
23.0	22.66	26.34	23.0	21.76	49.23	23.1	36.80	61.91	23.1	11.80	4.44	23.1	15.59	12.30
24.0	22.94	25.95	24.0	21.65	48.99	24.1	36.80	61.55	24.1	11.74	4.21	24.1	15.53	11.95
25.0	23.27	25.60	25.0	21.52	48.72	25.1	36.81	61.21	25.1	11.68	3.94	25.1	15.48	11.62
26.0	23.62	25.26	26.0	21.40	48.44	26.0	36.82	60.88	26.1	11.62	3.67	26.1	15.45	11.30
27.0	23.96	24.94	27.0	21.29	48.13	27.0	36.83	60.56	27.1	11.55	3.39	27.1	15.41	11.00
27.9	24.24	24.64	28.0	21.19	47.81	28.0	36.83	60.25	28.1	11.49	3.08	28.1	15.37	10.71
28.9	24.47	24.33	29.0	21.13	47.48	29.0	36.83	59.96	29.0	11.44	2.76	29.1	15.32	10.43
29.9	24.66	24.01	30.0	21.06	47.16	30.0	36.81	59.67	30.0	11.39	2.42	30.1	15.26	10.14
30.9	24.81	23.67	31.0	21.01	46.83	31.0	36.79	59.35	31.0	11.35	2.11	31.1	15.20	9.86
31.9	24.98	23.33	32.0	20.97	46.51	32.0	36.77	59.03	32.0	11.32	1.82	32.1	15.13	9.54
50.92		+50.91	12.33		−12.29	6.91		+6.84	6.11		−6.03	8.17		+8.11
8^h	17^m	$47^s.546$	9^h	8^m	$41^s.594$	9^h	25^m	$39^s.275$	9^h	36^m	$19^s.026$	10^h	21^m	$19^s.949$
+88°	52′	37″.80	−85°	20′	26″.78	+81°	41′	10″.13	−80°	34′	39″.26	+82°	58′	17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. *seq.* Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
July	10 59	−84 9	July	12 13	+88 8	July	12 46	−84 41	July	12 48	+83 51	July	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
1.2	51.95	64.87	1.2	76.36	60.62	1.3	28.15	36.82	1.3	29.67	16.76	1.3	47.97	52.58
2.2	51.76	64.74	2.2	75.77	60.56	2.3	27.93	36.86	2.3	29.48	16.74	2.3	47.72	52.69
3.2	51.56	64.62	3.2	75.13	60.50	3.3	27.72	36.88	3.3	29.30	16.72	3.3	47.48	52.77
4.2	51.38	64.50	4.2	74.47	60.41	4.2	27.52	36.89	4.3	29.09	16.71	4.3	47.24	52.83
5.2	51.22	64.37	5.2	73.78	60.33	5.2	27.31	36.90	5.2	28.89	16.67	5.3	47.02	52.89
6.2	51.07	64.27	6.2	73.09	60.23	6.2	27.13	36.90	6.2	28.68	16.64	6.3	46.82	52.95
7.2	50.91	64.17	7.2	72.39	60.10	7.2	26.94	36.92	7.2	28.46	16.58	7.3	46.61	53.00
8.2	50.74	64.06	8.2	71.70	59.96	8.2	26.75	36.95	8.2	28.25	16.51	8.3	46.40	53.09
9.2	50.57	63.96	9.2	71.04	59.81	9.2	26.57	36.98	9.2	28.05	16.42	9.3	46.20	53.17
10.2	50.41	63.87	10.2	70.41	59.65	10.2	26.37	37.02	10.2	27.85	16.31	10.3	45.98	53.25
11.2	50.23	63.76	11.2	69.79	59.48	11.2	26.17	37.05	11.2	27.66	16.20	11.3	45.76	53.34
12.2	50.05	63.65	12.2	69.20	59.31	12.2	25.97	37.08	12.2	27.48	16.09	12.3	45.53	53.43
13.2	49.87	63.52	13.2	68.63	59.13	13.2	25.74	37.10	13.2	27.31	15.96	13.3	45.28	53.50
14.1	49.68	63.39	14.2	68.12	58.95	14.2	25.51	37.10	14.2	27.14	15.83	14.3	45.01	53.56
15.1	49.49	63.21	15.2	67.60	58.79	15.2	25.28	37.09	15.2	26.97	15.71	15.2	44.75	53.61
16.1	49.31	63.03	16.2	67.05	58.64	16.2	25.04	37.05	16.2	26.80	15.61	16.2	44.47	53.62
17.1	49.13	62.84	17.2	66.51	58.49	17.2	24.81	37.01	17.2	26.63	15.51	17.2	44.22	53.63
18.1	48.98	62.65	18.2	65.89	58.33	18.2	24.61	36.93	18.2	26.43	15.41	18.2	43.97	53.63
19.1	48.83	62.45	19.2	65.26	58.16	19.2	24.41	36.86	19.2	26.23	15.32	19.2	43.73	53.62
20.1	48.70	62.27	20.2	64.60	57.99	20.2	24.21	36.80	20.2	26.03	15.20	20.2	43.51	53.61
21.1	48.57	62.11	21.2	63.94	57.80	21.2	24.04	36.74	21.2	25.82	15.07	21.2	43.31	53.61
22.1	48.45	61.96	22.2	63.29	57.57	22.2	23.87	36.70	22.2	25.61	14.90	22.2	43.11	53.62
23.1	48.31	61.81	23.2	62.68	57.33	23.2	23.70	36.67	23.2	25.42	14.72	23.2	42.91	53.65
24.1	48.17	61.67	24.2	62.12	57.08	24.2	23.52	36.66	24.2	25.24	14.52	24.2	42.69	53.68
25.1	48.01	61.50	25.2	61.61	56.83	25.2	23.31	36.63	25.2	25.08	14.31	25.2	42.45	53.69
26.1	47.84	61.32	26.2	61.14	56.58	26.2	23.09	36.58	26.2	24.93	14.10	26.2	42.21	53.71
27.1	47.67	61.12	27.2	60.68	56.34	27.2	22.86	36.53	27.2	24.77	13.91	27.2	41.94	53.70
28.1	47.51	60.89	28.2	60.22	56.12	28.2	22.63	36.43	28.2	24.61	13.73	28.2	41.66	53.67
29.1	47.37	60.65	29.2	59.75	55.90	29.2	22.40	36.32	29.2	24.45	13.56	29.2	41.39	53.62
30.1	47.22	60.38	30.2	59.24	55.70	30.2	22.19	36.19	30.2	24.28	13.41	30.2	41.12	53.55
31.1	47.09	60.13	31.2	58.72	55.49	31.2	21.99	36.05	31.2	24.11	13.26	31.2	40.88	53.46
32.1	46.98	59.89	32.1	58.16	55.28	32.2	21.80	35.90	32.2	23.93	13.08	32.2	40.65	53.38
	9.84	−9.79		30.97	+30.95		10.81	−10.77		9.34	+9.29		12.42	−12.38
10^h	59^m	$54^s.546$	12^h	14^m	$29^s.190$	12^h	46^m	$19^s.119$	12^h	48^m	$31^s.308$	13^h	27^m	$32^s.891$
−84°	9′	29″.33	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
July	17 58	+86 36	July	18 8	−87 39	July	19 0	+89 1	July	19 33	−89 12	July	20 48	+82 14
	s	″		s	″		s	″		s	″		s	″
1.5	29.17	58.90	1.5	25.41	47.95	1.5	39.96	19.31	1.5	34.42	57.48	1.6	38.68	0.28
2.5	29.07	59.21	2.5	25.40	48.27	2.5	39.91	19.63	2.5	34.94	57.78	2.6	38.74	0.57
3.5	28.96	59.53	3.5	25.37	48.56	3.5	39.87	19.96	3.5	35.37	58.07	3.6	38.83	0.88
4.5	28.85	59.85	4.5	25.34	48.85	4.5	39.83	20.30	4.5	35.78	58.34	4.6	38.89	1.21
5.5	28.72	60.18	5.5	25.31	49.12	5.5	39.74	20.67	5.5	36.18	58.59	5.6	38.97	1.54
6.5	28.58	60.53	6.5	25.29	49.39	6.5	39.58	21.03	6.5	36.58	58.84	6.6	39.05	1.90
7.5	28.41	60.87	7.5	25.28	49.66	7.5	39.38	21.38	7.5	37.02	59.09	7.6	39.11	2.26
8.5	28.23	61.20	8.5	25.27	49.94	8.5	39.11	21.74	8.5	37.48	59.35	8.6	39.17	2.62
9.5	28.05	61.52	9.5	25.28	50.22	9.5	38.77	22.08	9.5	37.98	59.62	9.6	39.22	2.99
10.4	27.85	61.83	10.5	25.29	50.51	10.5	38.39	22.42	10.5	38.50	59.89	10.6	39.27	3.35
11.4	27.65	62.12	11.5	25.30	50.82	11.5	37.95	22.76	11.5	39.03	60.20	11.6	39.30	3.71
12.4	27.43	62.42	12.5	25.29	51.13	12.5	37.48	23.08	12.5	39.55	60.52	12.6	39.33	4.06
13.4	27.21	62.69	13.4	25.25	51.46	13.5	37.02	23.37	13.5	40.03	60.85	13.6	39.36	4.40
14.4	27.01	62.93	14.4	25.20	51.79	14.5	36.58	23.67	14.5	40.42	61.17	14.6	39.39	4.74
15.4	26.82	63.19	15.4	25.10	52.11	15.5	36.16	23.96	15.5	40.73	61.49	15.6	39.40	5.06
16.4	26.63	63.45	16.4	24.97	52.43	16.5	35.78	24.25	16.5	40.91	61.79	16.6	39.43	5.38
17.4	26.44	63.72	17.4	24.80	52.71	17.5	35.43	24.56	17.5	41.00	62.10	17.5	39.46	5.71
18.4	26.24	64.01	18.4	24.63	52.98	18.5	35.08	24.88	18.5	41.02	62.39	18.5	39.50	6.05
19.4	26.04	64.32	19.4	24.47	53.24	19.5	34.70	25.21	19.5	41.02	62.68	19.5	39.55	6.42
20.4	25.82	64.64	20.4	24.32	53.48	20.5	34.26	25.58	20.5	41.04	62.95	20.5	39.59	6.79
21.4	25.57	64.96	21.4	24.21	53.73	21.5	33.72	25.95	21.5	41.11	63.21	21.5	39.61	7.17
22.4	25.30	65.28	22.4	24.11	53.97	22.5	33.09	26.31	22.5	41.28	63.47	22.5	39.62	7.59
23.4	25.01	65.56	23.4	24.03	54.24	23.5	32.37	26.65	23.5	41.51	63.74	23.5	39.63	7.99
24.4	24.71	65.81	24.4	23.95	54.53	24.5	31.59	26.98	24.5	41.76	64.02	24.5	39.63	8.38
25.4	24.41	66.05	25.4	23.85	54.82	25.5	30.81	27.27	25.5	41.99	64.34	25.5	39.63	8.75
26.4	24.12	66.27	26.4	23.71	55.12	26.4	30.05	27.55	26.5	42.14	64.67	26.5	39.62	9.09
27.4	23.84	66.47	27.4	23.53	55.42	27.4	29.33	27.81	27.5	42.18	65.00	27.5	39.60	9.44
28.4	23.59	66.69	28.4	23.30	55.72	28.4	28.66	28.07	28.5	42.10	65.34	28.5	39.59	9.76
29.4	23.34	66.92	29.4	23.06	56.00	29.4	28.03	28.34	29.5	41.90	65.67	29.5	39.59	10.09
30.4	23.07	67.16	30.4	22.78	56.28	30.4	27.42	28.64	30.5	41.61	65.98	30.5	39.59	10.43
31.4	22.81	67.43	31.4	22.50	56.52	31.4	26.82	28.95	31.5	41.25	66.28	31.5	39.59	10.77
32.4	22.55	67.69	32.4	22.22	56.76	32.4	26.19	29.26	32.5	40.88	66.57	32.5	39.59	11.14
16.95	+16.92		24.54	−24.52		58.67	+58.66		73.18	−73.18		7.40	+7.33	
17^h	58^m	$22^s.311$	18^h	7^m	$23^s.343$	19^h	0^m	$15^s.079$	19^h	30^m	$50^s.769$	20^h	48^m	$32^s.146$
+86°	36′	51″.04	−87°	39′	50″.89	+89°	1′	12″.80	−89°	13′	13″.35	+82°	13′	56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ[1] Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
July	21 38	−83 5	July	22 16	−86 22	July	22 37	−81 47	July	23 27	+86 51	July	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
1.6	52.01	3.49	1.7	50.93	17.22	1.7	59.38	50.01	1.7	56.16	36.02	1.7	26.35	31.82
2.6	52.15	3.69	2.6	51.23	17.37	2.7	59.53	50.12	2.7	56.50	36.16	2.7	26.52	31.86
3.6	52.28	3.88	3.6	51.51	17.53	3.7	59.66	50.22	3.7	56.87	36.31	3.7	26.66	31.90
4.6	52.41	4.06	4.6	51.77	17.67	4.7	59.78	50.32	4.7	57.25	36.46	4.7	26.82	31.93
5.6	52.53	4.23	5.6	52.01	17.82	5.7	59.91	50.43	5.7	57.63	36.64	5.7	26.96	31.97
6.6	52.65	4.40	6.6	52.27	17.96	6.7	60.03	50.54	6.7	58.02	36.82	6.7	27.10	32.00
7.6	52.77	4.56	7.6	52.53	18.09	7.7	60.15	50.64	7.7	58.41	37.02	7.7	27.25	32.02
8.6	52.90	4.72	8.6	52.80	18.22	8.6	60.28	50.73	8.7	58.78	37.25	8.7	27.40	32.04
9.6	53.04	4.88	9.6	53.07	18.35	9.6	60.42	50.82	9.7	59.14	37.48	9.7	27.57	32.05
10.6	53.18	5.04	10.6	53.36	18.48	10.6	60.56	50.91	10.7	59.48	37.71	10.7	27.73	32.06
11.6	53.32	5.21	11.6	53.65	18.62	11.6	60.70	51.01	11.7	59.81	37.95	11.7	27.90	32.08
12.6	53.47	5.39	12.6	53.95	18.76	12.6	60.85	51.14	12.7	60.12	38.19	12.7	28.07	32.10
13.6	53.62	5.59	13.6	54.25	18.93	13.6	61.00	51.26	13.7	60.41	38.43	13.7	28.25	32.13
14.6	53.77	5.82	14.6	54.54	19.11	14.6	61.14	51.40	14.7	60.68	38.66	14.7	28.43	32.19
15.6	53.90	6.04	15.6	54.83	19.31	15.6	61.28	51.58	15.7	60.96	38.87	15.7	28.59	32.27
16.6	54.01	6.28	16.6	55.10	19.54	16.6	61.41	51.76	16.7	61.25	39.09	16.7	28.76	32.35
17.6	54.11	6.53	17.6	55.33	19.77	17.6	61.53	51.95	17.7	61.56	39.30	17.7	28.90	32.46
18.6	54.21	6.77	18.6	55.53	19.97	18.6	61.63	52.14	18.7	61.88	39.51	18.7	29.05	32.58
19.6	54.30	7.00	19.6	55.73	20.17	19.6	61.73	52.32	19.7	62.21	39.74	19.7	29.18	32.68
20.6	54.39	7.20	20.6	55.92	20.36	20.6	61.83	52.47	20.6	62.56	39.98	20.7	29.31	32.79
21.6	54.47	7.40	21.6	56.13	20.54	21.6	61.93	52.62	21.6	62.91	40.25	21.7	29.44	32.88
22.6	54.57	7.59	22.6	56.35	20.71	22.6	62.03	52.77	22.6	63.25	40.54	22.7	29.58	32.96
23.6	54.68	7.77	23.6	56.59	20.87	23.6	62.16	52.91	23.6	63.55	40.85	23.7	29.72	33.01
24.6	54.81	7.97	24.6	56.83	21.06	24.6	62.29	53.05	24.6	63.82	41.17	24.7	29.88	33.08
25.6	54.93	8.20	25.6	57.08	21.26	25.6	62.42	53.22	25.6	64.06	41.48	25.6	30.05	33.17
26.6	55.04	8.46	26.6	57.34	21.49	26.6	62.55	53.40	26.6	64.30	41.79	26.6	30.22	33.27
27.6	55.15	8.72	27.6	57.59	21.73	27.6	62.68	53.61	27.6	64.52	42.08	27.6	30.37	33.39
28.6	55.25	9.00	28.6	57.82	21.99	28.6	62.78	53.84	28.6	64.73	42.35	28.6	30.52	33.53
29.5	55.33	9.29	29.6	58.01	22.26	29.6	62.88	54.08	29.6	64.97	42.62	29.6	30.67	33.71
30.5	55.39	9.58	30.6	58.19	22.54	30.6	62.97	54.33	30.6	65.23	42.89	30.6	30.81	33.89
31.5	55.45	9.86	31.6	58.34	22.80	31.6	63.06	54.58	31.6	65.49	43.16	31.6	30.93	34.08
32.5	55.50	10.13	32.6	58.48	23.06	32.6	63.13	54.81	32.6	65.77	43.43	32.6	31.05	34.27

λ Octantis		ν Octantis		β Octantis		39 H. Cephei		γ[1] Octantis	
8.31	−8.24	15.80	−15.77	7.01	−6.94	18.26	+18.23	7.62	−7.55
$21^h\ 38^m\ 38^s.548$		$22^h\ 16^m\ 33^s.212$		$22^h\ 37^m\ 51^s.624$		$23^h\ 27^m\ 43^s.571$		$23^h\ 47^m\ 23^s.637$	
−83° 5′ 34″.33		−86° 22′ 50″.92		−81° 48′ 24″.80		+86° 51′ 38″.62		−82° 28′ 8″.42	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			*α* Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Aug.	0 57	+85 49	Aug.	1 32	+88 52	Aug.	1 41	−85 10	Aug.	4 10	+85 20	Aug.	5 35	+85 9
	s	″		s	″		s	″		s	″		s	″
0.7	42.20	22.49	0.7	7.59	16.22	0.7	51.02	10.93	0.8	48.15	15.95	0.9	56.02	19.08
1.7	42.49	22.66	1.7	8.71	16.34	1.7	51.26	11.00	1.8	48.42	15.84	1.9	56.23	18.86
2.7	42.79	22.85	2.7	9.88	16.48	2.7	51.48	11.06	2.8	48.71	15.72	2.9	56.46	18.63
3.7	43.09	23.05	3.7	11.05	16.63	3.7	51.71	11.12	3.8	49.03	15.62	3.9	56.71	18.41
4.7	43.39	23.27	4.7	12.22	16.80	4.7	51.93	11.17	4.8	49.34	15.54	4.9	56.96	18.21
5.7	43.68	23.50	5.7	13.38	16.98	5.7	52.15	11.21	5.8	49.66	15.48	5.9	57.23	18.02
6.7	43.96	23.75	6.7	14.51	17.18	6.7	52.38	11.25	6.8	49.98	15.42	6.9	57.50	17.84
7.7	44.24	24.01	7.7	15.59	17.41	7.7	52.62	11.28	7.8	50.30	15.39	7.9	57.78	17.68
8.7	44.48	24.27	8.7	16.62	17.63	8.7	52.87	11.31	8.8	50.61	15.38	8.9	58.06	17.53
9.7	44.73	24.54	9.7	17.61	17.83	9.7	53.12	11.35	9.8	50.92	15.37	9.8	58.34	17.38
10.7	44.96	24.81	10.7	18.55	18.04	10.7	53.38	11.40	10.8	51.21	15.36	10.8	58.59	17.26
11.7	45.18	25.06	11.7	19.45	18.25	11.7	53.65	11.48	11.8	51.50	15.36	11.8	58.84	17.14
12.6	45.40	25.30	12.7	20.35	18.45	12.7	53.89	11.58	12.8	51.77	15.36	12.8	59.08	17.01
13.6	45.62	25.53	13.7	21.27	18.63	13.7	54.14	11.70	13.8	52.04	15.32	13.8	59.32	16.87
14.6	45.85	25.76	14.7	22.25	18.82	14.7	54.37	11.83	14.8	52.32	15.29	14.8	59.56	16.71
15.6	46.10	25.99	15.7	23.29	19.00	15.7	54.59	11.96	15.8	52.61	15.25	15.8	59.81	16.53
16.6	46.37	26.23	16.7	24.39	19.22	16.7	54.79	12.10	16.8	52.93	15.21	16.8	60.08	16.36
17.6	46.65	26.51	17.7	25.51	19.44	17.7	54.99	12.23	17.8	53.26	15.17	17.8	60.36	16.18
18.6	46.93	26.80	18.7	26.63	19.66	18.7	55.18	12.33	18.8	53.59	15.16	18.8	60.66	16.03
19.6	47.20	27.11	19.7	27.72	19.92	19.7	55.37	12.44	19.8	53.96	15.17	19.8	60.98	15.89
20.6	47.45	27.44	20.7	28.73	20.20	20.7	55.59	12.54	20.8	54.30	15.21	20.8	61.30	15.79
21.6	47.64	27.76	21.6	29.68	20.48	21.7	55.82	12.63	21.8	54.63	15.26	21.8	61.61	15.71
22.6	47.84	28.09	22.6	30.54	20.76	22.7	56.06	12.73	22.8	54.95	15.32	22.8	61.89	15.63
23.6	48.04	28.40	23.6	31.34	21.04	23.6	56.29	12.86	23.8	55.24	15.39	23.8	62.20	15.57
24.6	48.22	28.70	24.6	32.13	21.30	24.6	56.53	13.01	24.8	55.53	15.45	24.8	62.48	15.49
25.6	48.39	28.99	25.6	32.92	21.55	25.6	56.77	13.19	25.7	55.81	15.50	25.8	62.74	15.41
26.6	48.58	29.27	26.6	33.74	21.79	26.6	56.99	13.38	26.7	56.08	15.51	26.8	63.00	15.32
27.6	48.77	29.54	27.6	34.60	22.03	27.6	57.19	13.59	27.7	56.37	15.53	27.8	63.26	15.22
28.6	48.98	29.82	28.6	35.51	22.27	28.6	57.38	13.79	28.7	56.67	15.56	28.8	63.52	15.11
29.6	49.20	30.11	29.6	36.44	22.52	29.6	57.56	14.01	29.7	56.98	15.59	29.8	63.78	15.00
30.6	49.43	30.42	30.6	37.37	22.79	30.6	57.74	14.23	30.7	57.29	15.61	30.8	64.10	14.88
31.6	49.64	30.73	31.6	38.31	23.05	31.6	57.91	14.42	31.7	57.62	15.64	31.8	64.40	14.77
13.73		+13.70	50.80		+50.79	11.88		−11.83	12.30		+12.26	11.84		+11.80
0^h	57^m	$24^s.633$	1^h	31^m	$11^s.709$	1^h	41^m	$54^s.846$	4^h	10^m	$37^s.831$	5^h	35^m	$50^s.330$
+85°	49′	24″.14	+88°	52′	20″.55	−85°	10′	45″.22	+85°	20′	28″.88	+85°	9′	34″.51

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Aug.	5 45	−84 49	Aug.	6 46	−80 43	Aug.	7 3	+87 10	Aug.	7 14	+82 33	Aug.	7 14	−86 54
	s	″		s	″		s	″		s	″		s	″
0.9	29.31	34.64	0.9	37.08	45.38	0.9	1.79	27.93	0.9	8.99	61.97	0.9	59.71	23.79
1.9	29.47	34.40	1.9	37.14	45.11	1.9	2.01	27.62	1.9	9.07	61.65	1.9	59.84	23.51
2.9	29.62	34.18	2.9	37.19	44.85	2.9	2.25	27.31	2.9	9.16	61.34	2.9	59.97	23.24
3.9	29.76	33.96	3.9	37.26	44.58	3.9	2.53	26.99	3.9	9.25	61.03	3.9	60.10	22.98
4.9	29.90	33.76	4.9	37.31	44.32	4.9	2.82	26.68	4.9	9.36	60.72	4.9	60.20	22.72
5.9	30.04	33.54	5.9	37.37	44.05	5.9	3.13	26.37	5.9	9.49	60.41	5.9	60.31	22.45
6.9	30.18	33.31	6.9	37.42	43.77	6.9	3.46	26.08	6.9	9.61	60.12	6.9	60.42	22.18
7.9	30.32	33.08	7.9	37.48	43.49	7.9	3.81	25.79	7.9	9.75	59.84	7.9	60.52	21.89
8.9	30.47	32.83	8.9	37.55	43.20	8.9	4.17	25.52	8.9	9.88	59.57	8.9	60.63	21.60
9.9	30.62	32.58	9.9	37.61	42.90	9.9	4.53	25.28	9.9	10.02	59.33	9.9	60.76	21.29
10.9	30.80	32.33	10.9	37.67	42.60	10.9	4.87	25.05	10.9	10.15	59.08	10.9	60.89	20.97
11.9	30.98	32.07	11.9	37.76	42.30	11.9	5.20	24.81	11.9	10.27	58.85	11.9	61.05	20.66
12.8	31.16	31.83	12.9	37.83	42.01	12.9	5.51	24.57	12.9	10.38	58.62	12.9	61.24	20.34
13.8	31.35	31.62	13.9	37.91	41.73	13.9	5.80	24.33	13.9	10.49	58.37	13.9	61.43	20.06
14.8	31.55	31.43	14.9	38.00	41.48	14.9	6.10	24.07	14.9	10.59	58.11	14.9	61.66	19.78
15.8	31.75	31.27	15.9	38.09	41.24	15.9	6.41	23.79	15.9	10.70	57.82	15.9	61.90	19.54
16.8	31.94	31.12	16.9	38.18	41.02	16.9	6.73	23.51	16.9	10.83	57.54	16.9	62.12	19.31
17.8	32.12	30.99	17.9	38.27	40.82	17.9	7.10	23.22	17.9	10.97	57.25	17.9	62.31	19.10
18.8	32.28	30.83	18.9	38.35	40.62	18.9	7.50	22.93	18.9	11.12	56.94	18.9	62.51	18.89
19.8	32.45	30.66	19.9	38.43	40.40	19.9	7.92	22.66	19.9	11.29	56.66	19.9	62.69	18.66
20.8	32.63	30.49	20.9	38.51	40.17	20.9	8.37	22.42	20.9	11.46	56.41	20.9	62.86	18.41
21.8	32.81	30.31	21.9	38.59	39.93	21.9	8.82	22.18	21.9	11.63	56.17	21.9	63.04	18.14
22.8	32.99	30.10	22.9	38.68	39.67	22.9	9.25	21.97	22.9	11.80	55.96	22.9	63.24	17.88
23.8	33.19	29.90	23.9	38.76	39.40	23.9	9.66	21.78	23.9	11.95	55.77	23.9	63.46	17.58
24.8	33.41	29.70	24.9	38.86	39.15	24.9	10.04	21.59	24.9	12.09	55.57	24.9	63.70	17.31
25.8	33.64	29.54	25.9	38.97	38.91	25.9	10.41	21.40	25.9	12.23	55.37	25.9	63.97	17.03
26.8	33.87	29.40	26.9	39.08	38.69	26.9	10.78	21.20	26.9	12.36	55.15	26.9	64.26	16.78
27.8	34.10	29.28	27.8	39.19	38.48	27.9	11.13	20.98	27.9	12.48	54.93	27.9	64.56	16.55
28.8	34.33	29.17	28.8	39.30	38.30	28.9	11.49	20.74	28.9	12.62	54.68	28.9	64.86	16.34
29.8	34.55	29.07	29.8	39.41	38.13	29.9	11.87	20.49	29.9	12.77	54.44	29.9	65.16	16.14
30.8	34.76	28.98	30.8	39.53	37.98	30.9	12.29	20.25	30.9	12.92	54.19	30.9	65.46	15.95
31.8	34.98	28.90	31.8	39.64	37.83	31.8	12.71	20.02	31.9	13.07	53.95	31.9	65.75	15.77
	11.09	−11.04		6.21	−6.13		20.28	+20.25		7.73	+7.66		18.52	−18.50
	$5^h\ 45^m\ 51^s.396$			$6^h\ 46^m\ 48^s.653$			$7^h\ 3^m\ 2^s.335$			$7^h\ 14^m\ 7^s.912$			$7^h\ 15^m\ 39^s.691$	
	−84° 49′ 44″.27			−80° 43′ 46″.14			+87° 10′ 43″.86			+82° 34′ 17″.32			−86° 54′ 19″.75	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Aug.	8 17	+88 52	Aug.	9 8	−85 20	Aug.	9 25	+81 40	Aug.	9 36	−80 34	Aug.	10 21	+82 57
	s	″		s	″		s	″		s	″		s	″
0.9	24.98	23.33	1.0	20.97	46.51	1.0	36.77	59.03	1.0	11.32	61.82	1.1	15.13	69.54
1.9	25.16	22.99	2.0	20.94	46.23	2.0	36.75	58.69	2.0	11.30	61.54	2.1	15.06	69.22
2.9	25.39	22.62	3.0	20.91	45.96	3.0	36.73	58.35	3.0	11.27	61.25	3.1	15.00	68.89
3.9	25.69	22.26	4.0	20.89	45.68	4.0	36.72	57.98	4.0	11.26	60.98	4.1	14.94	68.55
4.9	26.03	21.89	5.0	20.85	45.40	5.0	36.73	57.61	5.0	11.24	60.71	5.1	14.89	68.19
5.9	26.44	21.53	6.0	20.82	45.13	6.0	36.74	57.24	6.0	11.21	60.43	6.1	14.85	67.83
6.9	26.90	21.19	7.0	20.78	44.85	7.0	36.77	56.88	7.0	11.18	60.15	7.1	14.82	67.46
7.9	27.40	20.85	8.0	20.74	44.55	8.0	36.80	56.54	8.0	11.15	59.87	8.1	14.81	67.10
8.9	27.95	20.51	8.9	20.70	44.25	9.0	36.84	56.19	9.0	11.11	59.57	9.1	14.80	66.75
9.9	28.49	20.19	9.9	20.66	43.94	10.0	36.88	55.86	10.0	11.08	59.26	10.0	14.80	66.42
10.9	29.03	19.88	10.9	20.61	43.61	11.0	36.91	55.52	11.0	11.06	58.93	11.0	14.79	66.09
11.9	29.55	19.57	11.9	20.59	43.28	12.0	36.93	55.20	12.0	11.03	58.60	12.0	14.78	65.77
12.9	30.03	19.28	12.9	20.59	42.93	13.0	36.95	54.89	13.0	11.02	58.24	13.0	14.77	65.46
13.9	30.46	18.97	13.9	20.59	42.59	13.9	36.97	54.57	14.0	11.01	57.91	14.0	14.74	65.14
14.9	30.87	18.65	14.9	20.63	42.26	14.9	36.98	54.24	15.0	11.01	57.58	15.0	14.70	64.82
15.9	31.27	18.31	15.9	20.67	41.96	15.9	37.00	53.91	16.0	11.01	57.28	16.0	14.66	64.47
16.9	31.73	17.96	16.9	20.71	41.67	16.9	37.01	53.54	16.9	11.02	56.99	17.0	14.63	64.10
17.9	32.26	17.60	17.9	20.75	41.40	17.9	37.05	53.18	17.9	11.04	56.70	18.0	14.62	63.73
18.9	32.88	17.24	18.9	20.78	41.13	18.9	37.08	52.78	18.9	11.05	56.44	19.0	14.61	63.33
19.9	33.59	16.89	19.9	20.80	40.87	19.9	37.13	52.39	19.9	11.05	56.18	20.0	14.61	62.94
20.9	34.36	16.53	20.9	20.81	40.58	20.9	37.19	52.02	20.9	11.04	55.90	21.0	14.64	62.54
21.9	35.15	16.21	21.9	20.82	40.29	21.9	37.26	51.65	21.9	11.04	55.60	22.0	14.68	62.15
22.9	35.94	15.92	22.9	20.83	39.97	22.9	37.33	51.31	22.9	11.04	55.28	23.0	14.72	61.80
23.9	36.70	15.63	23.9	20.86	39.64	23.9	37.40	50.99	23.9	11.04	54.94	24.0	14.75	61.47
24.9	37.40	15.35	24.9	20.89	39.30	24.9	37.47	50.69	24.9	11.04	54.60	25.0	14.76	61.14
25.9	38.05	15.07	25.9	20.95	38.96	25.9	37.51	50.38	25.9	11.05	54.25	26.0	14.77	60.80
26.9	38.66	14.79	26.9	21.03	38.64	26.9	37.56	50.06	26.9	11.08	53.90	27.0	14.78	60.46
27.9	39.26	14.51	27.9	21.12	38.32	27.9	37.60	49.74	27.9	11.11	53.59	27.9	14.78	60.13
28.9	39.87	14.21	28.9	21.22	38.03	28.9	37.64	49.39	28.9	11.15	53.27	28.9	14.78	59.78
29.9	40.52	13.88	29.9	21.32	37.73	29.9	37.68	49.03	29.9	11.19	52.99	29.9	14.79	59.41
30.9	41.22	13.54	30.9	21.42	37.45	30.9	37.73	48.67	30.9	11.23	52.69	30.9	14.80	59.03
31.9	41.97	13.22	31.9	21.52	37.17	31.9	37.79	48.31	31.9	11.27	52.40	31.9	14.81	58.66

Groombridge 1119.	ζ Octantis.	1 H. Draconis.	ζ Chamæleontis.	30 H. Camelop.
50.79 +50.78	12.32 −12.28	6.91 +6.84	6.11 −6.03	8.17 +8.11
$8^h\ 17^m\ 47^s.546$	$9^h\ 8^m\ 41^s.594$	$9^h\ 25^m\ 39^s.275$	$9^h\ 36^m\ 19^s.026$	$10^h\ 21^m\ 19^s.949$
$+88°\ 52'\ 37''.80$	$-85°\ 20'\ 26''.78$	$+81°\ 41'\ 10''.13$	$-80°\ 34'\ 39''.26$	$+82°\ 58'\ 17''.67$

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			*ι* Octantis. Mag. 5.4			32 H. Camelop. *seq.* Mag. 5.3			*κ* Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Aug.	10 59	−84 9	Aug.	12 13	+88 8	Aug.	12 46	−84 41	Aug.	12 48	+83 51	Aug.	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
1.1	46.98	59.89	1.1	58.16	55.28	1.2	21.80	35.90	1.2	23.93	13.08	1.2	40.65	53.38
2.1	46.88	59.64	2.1	57.59	55.06	2.2	21.62	35.75	2.2	23.74	12.91	2.2	40.42	53.29
3.1	46.78	59.41	3.1	57.02	54.82	3.2	21.45	35.62	3.2	23.55	12.72	3.2	40.21	53.19
4.1	46.68	59.17	4.1	56.47	54.55	4.2	21.28	35.48	4.2	23.37	12.52	4.2	40.00	53.10
5.1	46.57	58.95	5.1	55.94	54.28	5.2	21.11	35.36	5.2	23.19	12.29	5.2	39.80	53.02
6.1	46.46	58.73	6.1	55.42	53.99	6.2	20.94	35.25	6.2	23.02	12.06	6.2	39.58	52.96
7.1	46.36	58.51	7.1	54.95	53.69	7.2	20.76	35.13	7.2	22.86	11.82	7.2	39.36	52.89
8.1	46.25	58.28	8.1	54.51	53.39	8.2	20.58	35.00	8.2	22.71	11.55	8.2	39.14	52.82
9.1	46.12	58.04	9.1	54.09	53.09	9.2	20.38	34.87	9.2	22.56	11.29	9.2	38.90	52.74
10.1	46.00	57.80	10.1	53.71	52.80	10.1	20.19	34.75	10.1	22.43	11.02	10.2	38.66	52.66
11.1	45.88	57.52	11.1	53.35	52.52	11.1	19.99	34.59	11.1	22.29	10.78	11.2	38.40	52.56
12.1	45.77	57.24	12.1	52.98	52.25	12.1	19.78	34.41	12.1	22.16	10.55	12.2	38.15	52.43
13.1	45.67	56.95	13.1	52.60	51.99	13.1	19.58	34.22	13.1	22.02	10.32	13.2	37.89	52.30
14.1	45.57	56.64	14.1	52.19	51.73	14.1	19.40	34.00	14.1	21.88	10.10	14.2	37.65	52.13
15.1	45.49	56.33	15.1	51.73	51.46	15.1	19.22	33.78	15.1	21.72	9.88	15.2	37.42	51.95
16.1	45.43	56.04	16.1	51.25	51.17	16.1	19.07	33.58	16.1	21.56	9.65	16.2	37.23	51.78
17.1	45.38	55.76	17.1	50.76	50.86	17.1	18.94	33.38	17.1	21.39	9.39	17.2	37.04	51.63
18.1	45.33	55.51	18.1	50.29	50.54	18.1	18.81	33.18	18.1	21.22	9.11	18.2	36.87	51.48
19.0	45.28	55.27	19.1	49.86	50.18	19.1	18.68	33.00	19.1	21.07	8.81	19.2	36.69	51.33
20.0	45.22	55.03	20.1	49.46	49.82	20.1	18.54	32.85	20.1	20.92	8.49	20.1	36.51	51.21
21.0	45.13	54.78	21.1	49.11	49.46	21.1	18.40	32.68	21.1	20.79	8.17	21.1	36.31	51.09
22.0	45.05	54.51	22.1	48.82	49.12	22.1	18.22	32.50	22.1	20.69	7.85	22.1	36.09	50.97
23.0	44.97	54.23	23.1	48.55	48.77	23.1	18.05	32.32	23.1	20.58	7.52	23.1	35.88	50.83
24.0	44.88	53.91	24.1	48.29	48.44	24.1	17.90	32.10	24.1	20.48	7.23	24.1	35.64	50.66
25.0	44.82	53.58	25.1	48.02	48.11	25.1	17.73	31.86	25.1	20.37	6.95	25.1	35.41	50.47
26.0	44.76	53.25	26.1	47.73	47.82	26.1	17.54	31.61	26.1	20.26	6.67	26.1	35.18	50.25
27.0	44.71	52.91	27.1	47.41	47.53	27.1	17.40	31.34	27.1	20.13	6.40	27.1	34.98	50.03
28.0	44.68	52.58	28.1	47.07	47.21	28.1	17.25	31.06	28.1	20.00	6.13	28.1	34.79	49.79
29.0	44.66	52.26	29.1	46.72	46.90	29.1	17.14	30.79	29.1	19.86	5.85	29.1	34.60	49.56
30.0	44.65	51.97	30.1	46.37	46.57	30.1	17.03	30.52	30.1	19.73	5.56	30.1	34.45	49.32
31.0	44.64	51.67	31.1	46.02	46.23	31.1	16.92	30.26	31.1	19.60	5.25	31.1	34.29	49.09
32.0	44.63	51.37	32.1	45.69	45.86	32.1	16.82	30.02	32.1	19.47	4.92	32.1	34.14	48.87
9.84		−9.79	30.94		+30.92	10.81		−10.77	9.34		+9.28	12.42		−12.38
10ʰ	59ᵐ	54ˢ.546	12ʰ	14ᵐ	29ˢ.190	12ʰ	46ᵐ	19ˢ.119	12ʰ	48ᵐ	31ˢ.308	13ʰ	27ᵐ	32ˢ.891
−84°	9′	29″.33	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Aug.	14 13	−83 18	Aug.	15 2	+87 32	Aug.	15 24	−84 12	Aug.	16 54	+82 10	Aug.	17 16	−80 47
	s	″		s	″		s	″		s	″		s	″
1.2	56.39	26.22	1.3	45.20	53.02	1.3	40.68	21.76	1.3	12.59	36.98	1.4	33.30	26.76
2.2	56.24	26.18	2.3	44.64	53.03	2.3	40.50	21.81	2.3	12.44	37.18	2.4	33.22	26.93
3.2	56.09	26.14	3.3	44.07	53.04	3.3	40.34	21.86	3.3	12.29	37.37	3.4	33.13	27.08
4.2	55.93	26.11	4.3	43.50	53.04	4.3	40.17	21.90	4.3	12.14	37.56	4.4	33.06	27.25
5.2	55.79	26.10	5.3	42.90	53.01	5.3	40.01	21.96	5.3	11.97	37.71	5.3	32.98	27.42
6.2	55.65	26.09	6.3	42.33	52.98	6.3	39.84	22.02	6.3	11.80	37.86	6.3	32.91	27.60
7.2	55.49	26.07	7.3	41.76	52.93	7.3	39.67	22.09	7.3	11.63	37.99	7.3	32.83	27.79
8.2	55.34	26.05	8.2	41.19	52.85	8.3	39.50	22.17	8.3	11.46	38.10	8.3	32.75	27.97
9.2	55.17	26.03	9.2	40.66	52.76	9.3	39.31	22.26	9.3	11.31	38.21	9.3	32.67	28.17
10.2	54.99	26.00	10.2	40.14	52.66	10.3	39.12	22.32	10.3	11.15	38.30	10.3	32.59	28.37
11.2	54.81	25.96	11.2	39.62	52.58	11.3	38.92	22.39	11.3	11.00	38.39	11.3	32.50	28.57
12.2	54.63	25.91	12.2	39.12	52.50	12.3	38.71	22.44	12.3	10.85	38.46	12.3	32.39	28.76
13.2	54.45	25.83	13.2	38.62	52.44	13.2	38.49	22.44	13.3	10.70	38.56	13.3	32.28	28.93
14.2	54.26	25.74	14.2	38.12	52.37	14.2	38.27	22.45	14.3	10.54	38.69	14.3	32.15	29.07
15.2	54.10	25.60	15.2	37.58	52.32	15.2	38.06	22.44	15.3	10.38	38.81	15.3	32.04	29.21
16.2	53.95	25.48	16.2	37.03	52.27	16.2	37.87	22.40	16.3	10.21	38.93	16.3	31.93	29.31
17.2	53.80	25.37	17.2	36.43	52.22	17.2	37.70	22.37	17.3	10.04	39.06	17.3	31.84	29.41
18.2	53.67	25.26	18.2	35.83	52.13	18.2	37.54	22.36	18.3	9.86	39.18	18.3	31.75	29.51
19.2	53.55	25.17	19.2	35.22	52.01	19.2	37.39	22.34	19.3	9.67	39.28	19.3	31.66	29.60
20.2	53.41	25.09	20.2	34.64	51.88	20.2	37.21	22.34	20.3	9.48	39.35	20.3	31.58	29.72
21.2	53.27	25.03	21.2	34.07	51.73	21.2	37.04	22.36	21.3	9.30	39.40	21.3	31.49	29.86
22.2	53.12	24.95	22.2	33.54	51.57	22.2	36.85	22.37	22.3	9.12	39.42	22.3	31.39	30.01
23.2	52.94	24.86	23.2	33.02	51.41	23.2	36.66	22.38	23.3	8.95	39.43	23.3	31.29	30.16
24.2	52.77	24.74	24.2	32.55	51.26	24.2	36.45	22.37	24.3	8.78	39.44	24.3	31.18	30.30
25.2	52.60	24.61	25.2	32.06	51.12	25.2	36.23	22.33	25.3	8.62	39.48	25.3	31.05	30.41
26.2	52.43	24.45	26.2	31.58	50.99	26.2	36.00	22.27	26.3	8.47	39.51	26.3	30.91	30.51
27.2	52.26	24.27	27.2	31.08	50.88	27.2	35.79	22.20	27.3	8.29	39.56	27.3	30.78	30.58
28.2	52.11	24.08	28.2	30.57	50.78	28.2	35.59	22.11	28.3	8.12	39.61	28.3	30.64	30.64
29.2	51.96	23.91	29.2	30.04	50.66	29.2	35.39	22.01	29.3	7.94	39.67	29.3	30.52	30.68
30.2	51.83	23.72	30.2	29.49	50.53	30.2	35.19	21.90	30.3	7.77	39.73	30.3	30.39	30.72
31.2	51.69	23.54	31.2	28.94	50.39	31.2	35.01	21.80	31.3	7.60	39.78	31.3	30.28	30.76
32.1	51.56	23.35	32.2	28.39	50.24	32.2	34.84	21.71	32.3	7.41	39.83	32.3	30.17	30.80
	8.58	−8.52		23.37	+23.35		9.91	−9.86		7.35	+7.28		6.25	−6.17
14h	13m	46s.350	15h	3m	2s.510	15h	24m	23s.351	16h	54m	12s.991	17h	16m	17s.234
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.27

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Aug.	17 58	+86 37	Aug.	18 8	−87 39	Aug.	18 59	+89 1	Aug.	19 33	−89 13	Aug.	20 48	+82 14
	s	″		s	″		s	″		s	″		s	″
1.4	22.55	7.69	1.4	22.22	56.76	1.4	86.19	29.26	1.5	40.88	6.57	1.5	39.59	11.14
2.4	22.27	7.96	2.4	21.94	56.99	2.4	85.51	29.58	2.5	40.51	6.84	2.5	39.59	11.52
3.4	21.98	8.22	3.4	21.67	57.21	3.4	84.78	29.90	3.4	40.17	7.10	3.5	39.60	11.90
4.4	21.66	8.47	4.4	21.42	57.43	4.4	83.97	30.22	4.4	39.84	7.36	4.5	39.59	12.29
5.4	21.34	8.71	5.4	21.18	57.65	5.4	83.11	30.53	5.4	39.56	7.62	5.5	39.56	12.67
6.4	21.01	8.93	6.4	20.94	57.88	6.4	82.20	30.82	6.4	39.30	7.88	6.5	39.53	13.06
7.4	20.67	9.14	7.4	20.70	58.12	7.4	81.24	31.11	7.4	39.05	8.16	7.5	39.51	13.44
8.4	20.32	9.34	8.4	20.46	58.37	8.4	80.26	31.39	8.4	38.79	8.47	8.5	39.47	13.82
9.4	19.97	9.54	9.4	20.19	58.64	9.4	79.26	31.64	9.4	38.52	8.78	9.5	39.42	14.16
10.4	19.63	9.72	10.4	19.91	58.91	10.4	78.26	31.88	10.4	38.17	9.10	10.5	39.38	14.50
11.4	19.29	9.88	11.4	19.59	59.17	11.4	77.31	32.13	11.4	37.74	9.41	11.5	39.33	14.83
12.4	18.97	10.05	12.4	19.24	59.42	12.4	76.37	32.37	12.4	37.21	9.73	12.5	39.28	15.16
13.4	18.66	10.22	13.4	18.86	59.66	13.4	75.51	32.61	13.4	36.57	10.02	13.5	39.24	15.49
14.4	18.34	10.41	14.4	18.47	59.86	14.4	74.65	32.88	14.4	35.83	10.31	14.5	39.20	15.83
15.4	18.02	10.61	15.4	18.07	60.04	15.4	73.78	33.15	15.4	35.07	10.56	15.5	39.17	16.19
16.3	17.69	10.83	16.4	17.68	60.22	16.4	72.86	33.43	16.4	34.30	10.81	16.5	39.14	16.57
17.3	17.32	11.05	17.4	17.32	60.37	17.4	71.87	33.72	17.4	33.58	11.04	17.5	39.10	16.95
18.3	16.94	11.25	18.3	16.99	60.54	18.4	70.79	34.01	18.4	32.93	11.25	18.5	39.05	17.35
19.3	16.54	11.46	19.3	16.68	60.71	19.4	69.63	34.31	19.4	32.35	11.49	19.5	39.00	17.74
20.3	16.12	11.65	20.3	16.37	60.90	20.4	68.39	34.56	20.4	31.83	11.75	20.5	38.94	18.11
21.3	15.73	11.80	21.3	16.07	61.10	21.4	67.13	34.81	21.4	31.30	12.02	21.5	38.85	18.48
22.3	15.34	11.94	22.3	15.74	61.30	22.4	65.90	35.04	22.4	30.72	12.29	22.4	38.77	18.82
23.3	14.94	12.05	23.3	15.36	61.52	23.4	64.68	35.23	23.4	30.05	12.57	23.4	38.68	19.15
24.3	14.56	12.15	24.3	14.94	61.73	24.4	63.53	35.42	24.4	29.25	12.86	24.4	38.60	19.45
25.3	14.20	12.27	25.3	14.48	61.92	25.4	62.44	35.61	25.4	28.34	13.14	25.4	38.52	19.76
26.3	13.84	12.40	26.3	14.02	62.08	26.4	61.39	35.81	26.4	27.33	13.39	26.4	38.46	20.06
27.3	13.48	12.53	27.3	13.54	62.23	27.4	60.35	36.03	27.4	26.25	13.64	27.4	38.39	20.39
28.3	13.13	12.67	28.3	13.06	62.37	28.4	59.28	36.26	28.4	25.14	13.88	28.4	38.32	20.72
29.3	12.76	12.83	29.3	12.59	62.51	29.4	58.18	36.50	29.4	24.05	14.11	29.4	38.26	21.06
30.3	12.37	12.99	30.3	12.12	62.62	30.4	57.04	36.73	30.4	22.97	14.30	30.4	38.18	21.43
31.3	11.96	13.15	31.3	11.68	62.72	31.3	55.84	36.97	31.4	21.93	14.50	31.4	38.10	21.77
32.3	11.56	13.29	32.3	11.25	62.83	32.3	54.59	37.21	32.4	20.90	14.71	32.4	38.03	22.12

δ Ursæ Minoris	χ Octantis	λ Ursæ Minoris	σ Octantis	76 Draconis
16.96 +16.93	24.56 −24.54	58.82 +58.81	73.42 −73.41	7.40 +7.34
17h 58m 22s.311	18h 7m 23s.343	19h 0m 15s.079	19h 30m 50s.769	20h 48m 32s.146
+86° 36′ 51″.04	−87° 39′ 50″.89	+89° 1′ 12″.80	−89° 13′ 13″.35	+82° 13′ 56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			**υ Octantis.** Mag. 5.7			**β Octantis.** Mag. 4.3			**39 H. Cephei.** Mag. 5.6			**γ^1 Octantis.** Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Aug.	21 38	−83 5	Aug.	22 16	−86 22	Aug.	22 38	−81 47	Aug.	23 28	+86 51	Aug.	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
1.5	55.50	10.13	1.6	58.48	23.06	1.6	3.13	54.81	1.6	5.77	43.43	1.6	31.05	34.27
2.5	55.54	10.39	2.6	58.61	23.31	2.6	3.20	55.03	2.6	6.05	43.74	2.6	31.15	34.45
3.5	55.59	10.65	3.6	58.74	23.56	3.6	3.27	55.25	3.6	6.33	44.04	3.6	31.27	34.61
4.5	55.65	10.89	4.6	58.88	23.79	4.6	3.35	55.47	4.6	6.59	44.36	4.6	31.39	34.78
5.5	55.71	11.14	5.6	59.03	24.03	5.6	3.44	55.69	5.6	6.84	44.69	5.6	31.50	34.95
6.5	55.77	11.39	6.6	59.18	24.27	6.6	3.52	55.90	6.6	7.07	45.03	6.6	31.63	35.11
7.5	55.83	11.66	7.6	59.35	24.50	7.6	3.61	56.11	7.6	7.28	45.38	7.6	31.75	35.27
8.5	55.91	11.91	8.5	59.52	24.76	8.6	3.70	56.34	8.6	7.47	45.73	8.6	31.88	35.44
9.5	55.98	12.19	9.5	59.69	25.02	9.6	3.79	56.57	9.6	7.65	46.07	9.6	32.02	35.61
10.5	56.04	12.47	10.5	59.86	25.30	10.6	3.89	56.81	10.6	7.82	46.41	10.6	32.16	35.80
11.5	56.09	12.78	11.5	60.00	25.58	11.6	3.97	57.08	11.6	7.97	46.74	11.6	32.29	36.00
12.5	56.14	13.09	12.5	60.14	25.91	12.6	4.04	57.37	12.6	8.13	47.06	12.6	32.41	36.23
13.5	56.17	13.41	13.5	60.24	26.23	13.5	4.09	57.67	13.6	8.30	47.37	13.6	32.51	36.47
14.5	56.18	13.72	14.5	60.33	26.54	14.5	4.15	57.96	14.6	8.48	47.67	14.6	32.61	36.72
15.5	56.19	14.02	15.5	60.38	26.82	15.5	4.20	58.25	15.6	8.67	47.98	15.6	32.70	36.97
16.5	56.19	14.30	16.5	60.44	27.10	16.5	4.24	58.53	16.6	8.90	48.31	16.6	32.79	37.21
17.5	56.19	14.57	17.5	60.49	27.37	17.5	4.27	58.77	17.6	9.12	48.68	17.6	32.87	37.44
18.5	56.22	14.81	18.5	60.54	27.62	18.5	4.31	59.01	18.6	9.32	49.05	18.6	32.95	37.64
19.5	56.25	15.05	19.5	60.62	27.86	19.5	4.36	59.25	19.6	9.51	49.44	19.6	33.03	37.84
20.5	56.27	15.32	20.5	60.71	28.12	20.5	4.42	59.49	20.6	9.66	49.83	20.6	33.13	38.03
21.5	56.30	15.59	21.5	60.82	28.38	21.5	4.49	59.73	21.6	9.77	50.22	21.6	33.23	38.24
22.5	56.33	15.87	22.5	60.93	28.66	22.5	4.55	60.00	22.6	9.87	50.60	22.6	33.35	38.46
23.5	56.35	16.17	23.5	61.02	28.97	23.5	4.61	60.28	23.6	9.95	50.97	23.6	33.46	38.70
24.5	56.36	16.49	24.5	61.08	29.29	24.5	4.66	60.59	24.6	10.03	51.31	24.6	33.56	38.97
25.5	56.36	16.83	25.5	61.13	29.63	25.5	4.70	60.92	25.6	10.12	51.64	25.6	33.65	39.24
26.5	56.33	17.17	26.5	61.14	29.96	26.5	4.73	61.24	26.5	10.22	51.98	26.6	33.73	39.53
27.5	56.30	17.50	27.5	61.16	30.29	27.5	4.74	61.56	27.5	10.33	52.30	27.6	33.79	39.83
28.5	56.27	17.79	28.5	61.14	30.62	28.5	4.74	61.87	28.5	10.46	52.63	28.6	33.85	40.13
29.5	56.23	18.08	29.5	61.11	30.94	29.5	4.75	62.16	29.5	10.60	53.00	29.6	33.90	40.42
30.5	56.19	18.36	30.5	61.08	31.25	30.5	4.75	62.45	30.5	10.73	53.35	30.6	33.94	40.70
31.5	56.15	18.63	31.5	61.05	31.54	31.5	4.76	62.73	31.5	10.86	53.72	31.5	33.99	40.98
32.5	56.12	18.90	32.5	61.03	31.83	32.5	4.76	63.00	32.5	10.96	54.10	32.5	34.04	41.25
8.31		−8.25	15.81		−15.78	7.01		−6.94	18.28		+18.25	7.62		−7.56
21^h	38^m	$38^s.548$	22^h	16^m	$33^s.212$	22^h	37^m	$51^s.624$	23^h	27^m	$43^s.571$	23^h	47^m	$23^s.637$
−83°	5′	34″.33	−86°	22′	50″.92	−81°	48′	24″.80	+86°	51′	38″.62	−82°	28′	8″.42

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Sept.	0 57	+85 49	Sept.	1 32	+88 52	Sept.	1 41	−85 10	Sept.	4 10	+85 20	Sept.	5 36	+85 9
	s	″		s	″		s	″		s	″		s	″
0.6	49.64	30.73	0.6	38.31	23.05	0.6	57.91	14.42	0.7	57.62	15.64	0.8	4.40	14.77
1.6	49.85	31.06	1.6	39.24	23.33	1.6	58.08	14.62	1.7	57.95	15.70	1.8	4.71	14.69
2.6	50.05	31.40	2.6	40.13	23.64	2.6	58.26	14.81	2.7	58.28	15.79	2.8	5.03	14.62
3.6	50.24	31.75	3.6	40.97	23.96	3.6	58.43	14.99	3.7	58.61	15.88	3.8	5.35	14.56
4.6	50.42	32.11	4.6	41.77	24.28	4.6	58.61	15.18	4.7	58.94	15.98	4.8	5.67	14.52
5.6	50.57	32.47	5.6	42.52	24.61	5.6	58.80	15.37	5.7	59.25	16.11	5.8	5.99	14.51
6.6	50.72	32.82	6.6	43.19	24.94	6.6	59.00	15.57	6.7	59.54	16.24	6.8	6.29	14.49
7.6	50.86	33.16	7.6	43.84	25.27	7.6	59.20	15.78	7.7	59.84	16.37	7.8	6.58	14.49
8.6	50.99	33.50	8.6	44.48	25.58	8.6	59.38	16.01	8.7	60.12	16.48	8.8	6.87	14.48
9.6	51.12	33.82	9.6	45.11	25.87	9.6	59.59	16.25	9.7	60.40	16.59	9.8	7.15	14.45
10.6	51.25	34.13	10.6	45.79	26.15	10.6	59.74	16.52	10.7	60.67	16.68	10.8	7.42	14.41
11.6	51.40	34.44	11.6	46.51	26.43	11.6	59.89	16.80	11.7	60.95	16.77	11.8	7.70	14.37
12.6	51.58	34.76	12.6	47.29	26.72	12.6	60.02	17.07	12.7	61.26	16.86	12.8	7.98	14.32
13.6	51.75	35.09	13.6	48.10	27.03	13.6	60.14	17.34	13.7	61.57	16.94	13.8	8.31	14.27
14.6	51.93	35.47	14.6	48.92	27.36	14.6	60.26	17.60	14.7	61.90	17.04	14.8	8.63	14.23
15.6	52.10	35.84	15.6	49.72	27.72	15.6	60.37	17.84	15.7	62.24	17.16	15.7	8.97	14.20
16.6	52.25	36.25	16.6	50.45	28.10	16.6	60.50	18.07	16.7	62.57	17.32	16.7	9.32	14.19
17.6	52.39	36.65	17.6	51.09	28.47	17.6	60.62	18.29	17.7	62.91	17.50	17.7	9.66	14.22
18.5	52.49	37.05	18.6	51.67	28.85	18.6	60.76	18.52	18.7	63.21	17.69	18.7	10.00	14.26
19.5	52.58	37.44	19.6	52.16	29.22	19.6	60.92	18.76	19.7	63.50	17.88	19.7	10.32	14.31
20.5	52.66	37.81	20.6	52.61	29.56	20.6	61.07	19.03	20.7	63.77	18.07	20.7	10.61	14.37
21.5	52.74	38.15	21.6	53.06	29.91	21.6	61.22	19.32	21.7	64.03	18.25	21.7	10.88	14.42
22.5	52.81	38.48	22.6	53.52	30.23	22.6	61.35	19.62	22.7	64.29	18.40	22.7	11.16	14.46
23.5	52.89	38.81	23.6	54.02	30.55	23.6	61.46	19.93	23.7	64.54	18.56	23.7	11.44	14.48
24.5	52.99	39.16	24.6	54.56	30.87	24.6	61.56	20.26	24.7	64.80	18.70	24.7	11.71	14.50
25.5	53.09	39.49	25.6	55.12	31.19	25.6	61.65	20.58	25.7	65.08	18.84	25.7	12.00	14.50
26.5	53.20	39.85	26.6	55.72	31.51	26.6	61.73	20.92	26.7	65.36	18.97	26.7	12.29	14.50
27.5	53.32	40.22	27.5	56.29	31.85	27.6	61.79	21.21	27.7	65.65	19.14	27.7	12.61	14.52
28.5	53.43	40.60	28.5	56.85	32.21	28.6	61.86	21.51	28.7	65.95	19.31	28.7	12.92	14.55
29.5	53.52	40.98	29.5	57.38	32.58	29.5	61.92	21.81	29.7	66.25	19.50	29.7	13.25	14.60
30.5	53.60	41.37	30.5	57.87	32.96	30.5	61.99	22.09	30.6	66.54	19.69	30.7	13.57	14.68
31.5	53.67	41.76	31.5	58.31	33.34	31.5	62.07	22.38	31.6	66.84	19.92	31.7	13.89	14.76

43 H. Cephei.	α Ursæ Minoris.	4 G. Octantis.	Groombridge 750.	Groombridge 944.
13.74 +13.71	50.90 +50.89	11.88 −11.84	12.30 +12.26	11.84 +11.79
0^h 57^m $24^s.633$	1^h 31^m $11^s.709$	1^h 41^m $54^s.846$	4^h 10^m $37^s.831$	5^h 35^m $50^s.330$
+85° 49′ 24″.14	+88° 52′ 20″.55	−85° 10′ 45″.22	+85° 20′ 28″.88	+85° 9′ 34″.51

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Sept.	5 45	−84 49	Sept.	6 46	−80 43	Sept.	7 3	+87 10	Sept.	7 14	+82 33	Sept.	7 15	−86 54
	s	″		s	″		s	″		s	″		s	″
0.8	34.98	28.90	0.8	39.64	37.83	0.8	12.71	20.02	0.9	13.07	53.95	0.9	5.75	15.77
1.8	35.19	28.81	1.8	39.75	37.66	1.8	13.16	19.80	1.9	13.25	53.72	1.9	6.04	15.59
2.8	35.40	28.72	2.8	39.85	37.49	2.8	13.63	19.59	2.9	13.43	53.50	2.9	6.31	15.41
3.8	35.60	28.62	3.8	39.96	37.32	3.8	14.10	19.39	3.8	13.60	53.29	3.9	6.59	15.21
4.8	35.82	28.52	4.8	40.06	37.15	4.8	14.58	19.20	4.8	13.79	53.09	4.8	6.86	15.00
5.8	36.04	28.42	5.8	40.16	36.97	5.8	15.07	19.02	5.8	13 98	52.91	5.8	7.14	14.80
6.8	36.26	28.31	6.8	40.29	36.78	6.8	15.55	18.87	6.8	14.16	52.75	6.8	7.42	14.59
7.8	36.48	28.19	7.8	40.41	36.59	7.8	16.01	18.73	7.8	14.33	52.60	7.8	7.73	14.39
8.8	36.72	28.09	8.8	40.53	36.41	8.8	16.45	18.58	8.8	14.51	52.45	8.8	8.05	14.17
9.8	36.97	28.02	9.8	40.65	36.26	9.8	16.88	18.44	9.8	14.66	52.28	9.8	8.41	13.97
10.8	37.22	27.96	10.8	40.79	36.11	10.8	17.30	18.27	10.8	14.81	52.11	10.8	8.78	13.80
11.8	37.48	27.92	11.8	40.92	36.00	11.8	17.72	18.10	11.8	14.98	51.92	11.8	9.15	13.65
12.8	37.72	27.92	12.8	41.05	35.91	12.8	18.15	17.91	12.8	15.15	51.72	12.8	9.52	13.52
13.8	37.95	27.92	13.8	41.18	35.82	13.8	18.61	17.72	13.8	15.32	51.52	13.8	9.86	13.41
14.8	38.17	27.93	14.8	41.31	35.77	14.8	19.10	17.53	14.8	15.50	51.29	14.8	10.21	13.32
15.8	38.38	27.93	15.8	41.41	35.68	15.8	19.63	17.34	15.8	15.70	51.09	15.8	10.54	13.22
16.8	38.60	27.92	16.8	41.54	35.60	16.8	20.18	17.19	16.8	15.92	50.91	16.8	10.85	13.11
17.8	38.81	27.89	17.8	41.66	35.49	17.8	20.73	17.06	17.8	16.13	50.76	17.8	11.15	12.98
18.7	39.03	27.84	18.8	41.78	35.38	18.8	21.27	16.96	18.8	16.33	50.63	18.8	11.47	12.83
19.7	39.26	27.80	19.8	41.90	35.26	19.8	21.79	16.86	19.8	16.54	50.53	19.8	11.81	12.67
20.7	39.49	27.78	20.8	42.03	35.15	20.8	22.27	16.77	20.8	16.73	50.43	20.8	12.17	12.52
21.7	39.76	27.77	21.8	42.16	35.05	21.8	22.75	16.69	21.8	16.91	50.32	21.8	12.55	12.38
22.7	40.02	27.78	22.8	42.31	34.96	22.8	23.21	16.60	22.8	17.08	50.21	22.8	12.97	12.24
23.7	40.28	27.82	23.8	42.45	34.90	23.8	23.65	16.50	23.8	17.24	50.08	23.8	13.38	12.14
24.7	40.53	27.86	24.8	42.59	34.86	24.8	24.10	16.37	24.8	17.41	49.95	24.8	13.80	12.07
25.7	40.77	27.91	25.8	42.74	34.86	25.8	24.56	16.24	25.8	17.58	49.81	25.8	14.21	12.01
26.7	41.02	28.00	26.8	42.88	34.85	26.8	25.03	16.11	26.8	17.76	49.66	26.8	14.61	11.96
27.7	41.26	28.08	27.8	43.02	34.84	27.8	25.53	16.00	27.8	17.95	49.52	27.8	15.00	11.92
28.7	41.48	28.16	28.8	43.15	34.83	28.8	26.05	15.89	28.8	18.14	49.39	28.8	15.39	11.88
29.7	41.71	28.22	29.8	43.29	34.82	29.8	26.58	15.78	29.8	18.35	49.29	29.8	15.78	11.84
30.7	41.93	28.30	30.8	43.42	34.83	30.8	27.13	15.69	30.8	18.55	49.19	30.8	16.15	11.79
31.7	42.15	28.37	31.8	43.54	34.80	31.8	27.67	15.62	31.8	18.78	49.09	31.8	16.51	11.74
	11.09	−11.04		6.21	−6.12		20.26	+20.24		7.73	+7.66		18.51	−18.49
	5^h 45^m	$51^s.396$		6^h 46^m	$48^s.653$		7^h 3^m	$2^s.335$		7^h 14^m	$7^s.912$		7^h 15^m	$39^s.691$
	−84° 49′	44″.27		−80° 43′	46″.14		+87° 10′	43″.86		+82° 34′	17″.32		−86° 54′	19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Sept.	8 17	+88 52	Sept.	9 8	−85 20	Sept.	9 25	+81 40	Sept.	9 36	−80 34	Sept.	10 21	+82 57
	s	″		s	″		s	″		s	″		s	″
0.9	41.97	13.22	0.9	21.52	37.17	0.9	37.79	48.31	0.9	11.27	52.40	0.9	14.81	58.66
1.9	42.78	12.91	1.9	21.62	36.91	1.9	37.86	47.95	1.9	11.31	52.12	1.9	14.85	58.27
2.9	43.64	12.60	2.9	21.72	36.64	2.9	37.94	47.61	2.9	11.34	51.84	2.9	14.88	57.88
3.9	44.53	12.31	3.9	21.81	36.38	3.9	38.02	47.26	3.9	11.38	51.56	3.9	14.93	57.50
4.9	45.47	12.03	4.9	21.89	36.10	4.9	38.12	46.91	4.9	11.41	51.28	4.9	14.99	57.12
5.9	46.42	11.76	5.9	21.98	35.79	5.9	38.22	46.57	5.9	11.45	50.97	5.9	15.05	56.75
6.9	47.39	11.50	6.9	22.06	35.48	6.9	38.31	46.25	6.9	11.48	50.65	6.9	15.12	56.39
7.9	48.32	11.25	7.9	22.16	35.19	7.9	38.40	45.94	7.9	11.52	50.34	7.9	15.18	56.05
8.9	49.21	11.00	8.9	22.28	34.89	8.9	38.49	45.65	8.9	11.56	50.03	8.9	15.24	55.72
9.9	50.05	10.76	9.9	22.41	34.58	9.9	38.56	45.35	9.9	11.60	49.71	9.9	15.29	55.38
10.9	50.85	10.51	10.9	22.55	34.28	10.9	38.62	45.05	10.9	11.66	49.40	10.9	15.34	55.05
11.9	51.65	10.24	11.9	22.72	33.99	11.9	38.70	44.74	11.9	11.73	49.13	11.9	15.38	54.71
12.9	52.48	9.97	12.9	22.89	33.75	12.9	38.78	44.41	12.9	11.80	48.83	12.9	15.41	54.36
13.9	53.36	9.68	13.9	23.05	33.53	13.9	38.86	44.05	13.9	11.87	48.58	13.9	15.45	53.97
14.9	54.32	9.39	14.9	23.23	33.33	14.9	38.95	43.69	14.9	11.95	48.33	14.9	15.51	53.55
15.9	55.37	9.10	15.9	23.37	33.11	15.9	39.05	43.33	15.9	12.03	48.10	15.9	15.59	53.15
16.9	56.48	8.82	16.9	23.51	32.87	16.9	39.18	42.99	16.9	12.09	47.88	16.9	15.68	52.76
17.9	57.62	8.57	17.9	23.65	32.66	17.9	39.30	42.64	17.9	12.15	47.63	17.9	15.77	52.38
18.9	58.78	8.33	18.9	23.78	32.41	18.9	39.43	42.33	18.9	12.21	47.36	18.9	15.86	51.99
19.9	59.91	8.12	19.9	23.92	32.15	19.9	39.56	42.04	19.9	12.26	47.08	19.9	15.97	51.67
20.8	60.96	7.92	20.9	24.07	31.88	20.9	39.67	41.76	20.9	12.33	46.80	20.9	16.08	51.34
21.8	61.96	7.72	21.9	24.25	31.61	21.9	39.78	41.49	21.9	12.39	46.50	21.9	16.16	51.03
22.8	62.93	7.51	22.9	24.44	31.35	22.9	39.88	41.22	22.9	12.48	46.22	22.9	16.23	50.70
23.8	63.87	7.30	23.9	24.63	31.10	23.9	39.97	40.95	23.9	12.57	45.94	23.9	16.31	50.38
24.8	64.80	7.08	24.9	24.85	30.86	24.9	40.06	40.67	24.9	12.66	45.68	24.9	16.37	50.05
25.8	65.76	6.86	25.9	25.07	30.66	25.9	40.16	40.34	25.9	12.76	45.44	25.9	16.44	49.72
26.8	66.76	6.64	26.9	25.30	30.46	26.9	40.26	40.05	26.9	12.86	45.22	26.9	16.52	49.38
27.8	67.80	6.41	27.9	25.52	30.27	27.9	40.37	39.73	27.9	12.96	45.02	27.9	16.61	49.01
28.8	68.89	6.18	28.9	25.72	30.10	28.9	40.50	39.42	28.9	13.06	44.81	28.9	16.70	48.65
29.8	70.03	5.96	29.9	25.93	29.91	29.9	40.62	39.12	29.9	13.17	44.61	29.9	16.80	48.29
30.8	71.21	5.76	30.9	26.13	29.74	30.9	40.75	38.83	30.9	13.26	44.42	30.9	16.91	47.93
31.8	72.42	5.56	31.9	26.33	29.57	31.9	40.89	38.54	31.9	13.35	44.22	31.9	17.04	47.59

Groombridge 1119.	ζ Octantis.	1 H. Draconis.	ζ Chamæleontis.	30 H. Camelop.
50.67 +50.66	12.32 −12.28	6.91 +6.84	6.11 −6.03	8.16 +8.10
8h 17m 47s.546	9h 8m 41s.594	9h 25m 39s.275	9h 36m 19s.026	10h 21m 19s.949
+88° 52′ 37″.80	−85° 20′ 26″.78	+81° 41′ 10″.13	−80° 34′ 39″.26	+82° 58′ 17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. *seq.* Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Sept.	10 59	−84 9	Sept.	12 13	+88 8	Sept.	12 46	−84 41	Sept.	12 48	+83 50	Sept.	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
1.0	44.63	51.37	1.1	45.69	45.86	1.1	16.82	30.02	1.1	19.47	64.92	1.1	34.14	48.87
2.0	44.62	51.08	2.1	45.39	45.49	2.1	16.72	29.78	2.1	19.36	64.59	2.1	33.99	48.66
3.0	44.61	50.80	3.1	45.11	45.12	3.1	16.61	29.53	3.1	19.26	64.25	3.1	33.84	48.45
4.0	44.59	50.51	4.1	44.88	44.75	4.1	16.51	29.29	4.1	19.15	63.89	4.1	33.67	48.25
5.0	44.56	50.21	5.1	44.68	44.38	5.1	16.39	29.05	5.1	19.06	63.53	5.1	33.50	48.03
6.0	44.53	49.91	6.1	44.52	44.01	6.1	16.26	28.80	6.1	18.97	63.20	6.1	33.33	47.81
6.9	44.52	49.61	7.0	44.37	43.63	7.1	16.14	28.54	7.1	18.91	62.86	7.1	33.15	47.59
7.9	44.50	49.29	8.0	44.23	43.27	8.1	16.01	28.26	8.1	18.84	62.51	8.1	32.97	47.35
8.9	44.49	48.96	9.0	44.09	42.93	9.1	15.90	27.97	9.1	18.76	62.19	9.1	32.79	47.08
9.9	44.49	48.60	10.0	43.92	42.59	10.1	15.79	27.65	10.1	18.68	61.86	10.1	32.61	46.81
10.9	44.50	48.26	11.0	43.74	42.26	11.1	15.69	27.34	11.1	18.59	61.55	11.1	32.47	46.53
11.9	44.53	47.93	12.0	43.51	41.92	12.1	15.63	27.03	12.1	18.49	61.23	12.1	32.34	46.24
12.9	44.57	47.61	13.0	43.26	41.55	13.1	15.57	26.72	13.1	18.39	60.90	13.1	32.23	45.96
13.9	44.62	47.31	14.0	43.01	41.17	14.1	15.52	26.43	14.1	18.28	60.53	14.1	32.14	45.67
14.9	44.68	47.04	15.0	42.80	40.77	15.0	15.49	26.16	15.1	18.19	60.17	15.1	32.06	45.42
15.9	44.72	46.77	16.0	42.62	40.35	16.0	15.45	25.90	16.0	18.11	59.78	16.1	31.97	45.18
16.9	44.76	46.50	17.0	42.50	39.92	17.0	15.39	25.63	17.0	18.05	59.37	17.1	31.87	44.95
17.9	44.79	46.22	18.0	42.44	39.51	18.0	15.32	25.36	18.0	17.99	58.96	18.1	31.74	44.71
18.9	44.81	45.94	19.0	42.40	39.12	19.0	15.26	25.09	19.0	17.94	58.58	19.1	31.62	44.46
19.9	44.84	45.62	20.0	42.40	38.73	20.0	15.18	24.81	20.0	17.91	58.20	20.1	31.49	44.19
20.9	44.87	45.30	21.0	42.40	38.37	21.0	15.10	24.49	21.0	17.88	57.84	21.1	31.36	43.92
21.9	44.90	44.96	22.0	42.36	38.02	22.0	15.03	24.17	22.0	17.83	57.50	22.1	31.23	43.60
22.9	44.95	44.62	23.0	42.31	37.68	23.0	14.97	23.84	23.0	17.79	57.17	23.1	31.12	43.28
23.9	45.01	44.28	24.0	42.24	37.34	24.0	14.93	23.49	24.0	17.73	56.84	24.1	31.02	42.96
24.9	45.10	43.96	24.9	42.15	36.98	25.0	14.92	23.14	25.0	17.68	56.50	25.1	30.94	42.64
25.9	45.19	43.67	25.9	42.05	36.61	26.0	14.90	22.80	26.0	17.61	56.15	26.0	30.88	42.31
26.9	45.29	43.38	26.9	41.96	36.24	27.0	14.90	22.48	27.0	17.55	55.78	27.0	30.83	41.98
27.9	45.39	43.09	27.9	41.89	35.86	28.0	14.91	22.16	28.0	17.49	55.40	28.0	30.79	41.67
28.9	45.49	42.81	28.9	41.83	35.47	29.0	14.91	21.86	29.0	17.45	55.02	29.0	30.75	41.38
29.9	45.58	42.54	29.9	41.82	35.06	30.0	14.91	21.57	30.0	17.41	54.64	30.0	30.71	41.08
30.9	45.67	42.28	30.9	41.82	34.65	31.0	14.92	21.27	31.0	17.39	54.23	31.0	30.67	40.80
31.9	45.75	42.02	31.9	41.87	34.25	32.0	14.92	20.98	32.0	17.38	53.81	32.0	30.63	40.53

η Octantis	Bradley 1672	ι Octantis	32 H. Camelop. seq.	κ Octantis
9.83 −9.78	30.89 +30.87	10.81 −10.76	9.34 +9.28	12.41 −12.37
10^h 59^m $54^s.546$	12^h 14^m $29^s.190$	12^h 46^m $19^s.119$	12^h 48^m $31^s.308$	13^h 27^m $32^s.891$
−84° 9′ 29″.33	+88° 8′ 56″.19	−84° 41′ 1″.57	+83° 51′ 11″.30	−85° 22′ 19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Sept.	14 13	−83 18	Sept.	15 2	+87 32	Sept.	15 24	−84 12	Sept.	16 54	+82 10	Sept.	17 16	−80 47
	s	″		s	″		s	″		s	″		s	″
1.1	51.56	23.35	1.2	28.39	50.24	1.2	34.84	21.71	1.3	7.41	39.83	1.3	30.17	30.80
2.1	51.44	23.18	2.2	27.84	50.06	2.2	34.67	21.63	2.3	7.22	39.84	2.3	30.06	30.84
3.1	51.32	23.03	3.2	27.31	49.87	3.2	34.51	21.54	3.3	7.04	39.84	3.3	29.96	30.90
4.1	51.19	22.87	4.2	26.78	49.67	4.2	34.33	21.46	4.3	6,85	39.83	4.3	29.86	30.95
5.1	51.05	22.71	5.2	26.27	49.45	5.2	34.15	21.37	5.2	6.66	39.80	5.3	29.74	31.00
6.1	50.91	22.54	6.2	25.79	49.23	6.2	33.97	21.28	6.2	6.48	39.76	6.3	29.63	31.06
7.1	50.77	22.36	7.2	25.32	49.00	7.2	33.77	21.19	7.2	6.30	39.70	7.3	29.50	31.13
8.1	50.62	22.18	8.2	24.87	48.77	8.2	33.57	21.10	8.2	6.13	39.65	8.3	29.37	31.20
9.1	50.47	21.96	9.2	24.43	48.57	9.2	33.37	20.97	9.2	5.96	39.61	9.3	29.23	31.23
10.1	50.32	21.73	10.2	23.98	48.37	10.2	33.16	20.83	10.2	5.80	39.58	10.3	29.09	31.25
11.1	50.18	21.48	11.2	23.52	48.20	11.2	32.96	20.66	11.2	5.63	39.55	11.2	28.94	31.25
12.1	50.07	21.22	12.2	23.03	48.02	12.2	32.77	20.48	12.2	5.46	39.54	12.2	28.81	31.21
13.1	49.96	20.97	13.1	22.52	47.84	13.2	32.61	20.30	13.2	5.28	39.53	13.2	28.67	31.16
14.1	49.87	20.74	14.1	21.99	47.63	14.2	32.46	20.13	14.2	5.09	39.51	14.2	28.57	31.11
15.1	49.79	20.50	15.1	21.45	47.40	15.2	32.33	19.95	15.2	4.89	39.48	15.2	28.46	31.07
16.1	49.71	20.29	16.1	20.93	47.16	16.2	32.19	19.80	16.2	4.70	39.44	16.2	28.37	31.03
17.1	49.62	20.09	17.1	20.44	46.89	17.2	32.05	19.66	17.2	4.51	39.35	17.2	28.26	31.02
18.1	49.52	19.89	18.1	19.97	46.60	18.2	31.90	19.53	18.2	4.32	39.25	18.2	28.16	31.03
19.1	49.39	19.67	19.1	19.54	46.32	19.1	31.72	19.39	19.2	4.14	39.12	19.2	28.03	31.03
20.1	49.27	19.44	20.1	19.14	46.04	20.1	31.54	19.24	20.2	3.97	39.00	20.2	27.90	31.02
21.1	49.15	19.20	21.1	18.76	45.76	21.1	31.36	19.06	21.2	3.80	38.89	21.2	27.77	31.01
22.1	49.02	18.92	22.1	18.37	45.51	22.1	31.17	18.88	22.2	3.63	38.78	22.2	27.63	30.97
23.1	48.92	18.63	23.1	17.99	45.27	23.1	30.98	18.65	23.2	3.47	38.69	23.2	27.49	30.89
24.1	48.82	18.34	24.1	17.57	45.04	24.1	30.81	18.41	24.2	3.30	38.60	24.2	27.35	30.81
25.1	48.73	18.04	25.1	17.15	44.82	25.1	30.66	18.16	25.2	3.14	38.52	25.2	27.20	30.71
26.1	48.64	17.74	26.1	16.72	44.58	26.1	30.51	17.92	26.2	2.96	38.45	26.2	27.07	30.60
27.1	48.58	17.44	27.1	16.29	44.33	27.1	30.37	17.67	27.2	2.79	38.37	27.2	26.96	30.49
28.1	48.52	17.14	28.1	15.83	44.06	28.1	30.24	17.43	28.2	2.62	38.28	28.2	26.85	30.38
29.1	48.45	16.86	29.1	15.40	43.79	29.1	30.12	17.20	29.2	2.44	38.18	29.2	26.74	30.25
30.1	48.40	16.59	30.1	14.97	43.51	30.1	30.01	16.97	30.2	2.25	38.04	30.2	26.63	30.14
31.1	48.34	16.33	31.1	14.56	43.20	31.1	29.90	16.77	31.2	2.07	37.90	31.2	26.52	30.04
32.1	48.28	16.07	32.1	14.18	42.88	32.1	29.77	16.56	32.2	1.90	37.73	32.2	26.41	29.94
8.58		−8.52	23.36		+23.34	9.90		−9.85	7.35		+7.28	6.25		−6.17
14^h	13^m	$46^s.350$	15^h	3^m	$2^s.510$	15^h	24^m	$23^s.351$	16^h	54^m	$12^s.991$	17^h	16^m	$17^s.234$
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.27

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
...sh. ...an ...me.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
...pt.	17 57	+86 37	Sept.	18 7	−87 40	Sept.	18 59	+89 1	Sept.	19 32	−89 13	Sept.	20 48	+82 14
	s	″		s	″		s	″		s	″		s	″
1.3	71.56	13.29	1.3	71.25	2.83	1.3	54.59	37.21	1.4	80.90	14.71	1.4	38.03	22.12
2.3	71.14	13.41	2.3	70.83	2.94	2.3	53.29	37.43	2.4	79.91	14.92	2.4	37.94	22.46
3.3	70.72	13.51	3.3	70.41	3.05	3.3	51.96	37.63	3.4	78.96	15.13	3.4	37.85	22.80
4.3	70.28	13.61	4.3	70.00	3.16	4.3	50.58	37.81	4.4	78.01	15.35	4.4	37.74	23.13
5.3	69.85	13.68	5.3	69.57	3.29	5.3	49.19	37.99	5.4	77.04	15.57	5.4	37.64	23.45
6.3	69.43	13.73	6.3	69.12	3.42	6.3	47.81	38.13	6.4	76.04	15.79	6.4	37.53	23.75
7.3	69.01	13.77	7.3	68.66	3.56	7.3	46.45	38.27	7.4	74.95	16.02	7.4	37.42	24.04
8.3	68.62	13.81	8.3	68.17	3.69	8.3	45.14	38.41	8.3	73.78	16.26	8.4	37.30	24.31
9.3	68.23	13.87	9.3	67.65	3.79	9.3	43.88	38.56	9.3	72.52	16.49	9.4	37.19	24.59
10.3	67.84	13.95	10.3	67.10	3.88	10.3	42.66	38.73	10.3	71.18	16.68	10.4	37.09	24.88
11.3	67.45	14.03	11.3	66.55	3.94	11.3	41.44	38.90	11.3	69.78	16.86	11.4	36.99	25.17
12.3	67.05	14.11	12.3	66.03	4.00	12.3	40.19	39.07	12.3	68.38	17.02	12.4	36.89	25.49
13.3	66.64	14.21	13.3	65.52	4.03	13.3	38.89	39.27	13.3	67.01	17.15	13.4	36.79	25.81
14.3	66.21	14.30	14.3	65.05	4.04	14.3	37.51	39.46	14.3	65.72	17.27	14.4	36.68	26.14
15.3	65.75	14.39	15.3	64.61	4.07	15.3	36.04	39.64	15.3	64.50	17.39	15.4	36.58	26.47
16.3	65.29	14.44	16.3	64.18	4.10	16.3	34.51	39.79	16.3	63.36	17.52	16.4	36.45	26.79
17.3	64.82	14.45	17.3	63.76	4.15	17.3	32.96	39.93	17.3	62.24	17.67	17.4	36.32	27.09
18.3	64.36	14.46	18.3	63.31	4.21	18.3	31.40	40.04	18.3	61.09	17.84	18.4	36.18	27.38
19.3	63.93	14.45	19.3	62.84	4.30	19.3	29.87	40.14	19.3	59.88	18.01	19.4	36.03	27.63
20.3	63.50	14.44	20.3	62.33	4.37	20.3	28.43	40.22	20.3	58.57	18.17	20.4	35.90	27.87
21.2	63.08	14.42	21.3	61.78	4.43	21.3	27.04	40.30	21.3	57.15	18.34	21.4	35.76	28.11
22.2	62.70	14.41	22.3	61.22	4.45	22.3	25.71	40.37	22.3	55.63	18.49	22.4	35.63	28.33
23.2	62.29	14.42	23.3	60.65	4.46	23.3	24.39	40.47	23.3	54.04	18.63	23.4	35.51	28.56
24.2	61.89	14.43	24.2	60.08	4.45	24.3	23.08	40.58	24.3	52.42	18.74	24.4	35.38	28.81
25.2	61.49	14.45	25.2	59.51	4.41	25.3	21.74	40.70	25.3	50.81	18.84	25.4	35.26	29.08
26.2	61.08	14.47	26.2	58.97	4.37	26.3	20.38	40.81	26.3	49.21	18.91	26.4	35.14	29.34
27.2	60.66	14.48	27.2	58.45	4.32	27.3	18.96	40.93	27.3	47.66	18.97	27.4	35.01	29.61
28.2	60.23	14.49	28.2	57.95	4.26	28.3	17.51	41.05	28.3	46.16	19.04	28.3	34.89	29.88
29.2	59.78	14.49	29.2	57.46	4.22	29.3	16.01	41.15	29.3	44.71	19.12	29.3	34.75	30.13
30.2	59.33	14.48	30.2	56.98	4.19	30.3	14.46	41.24	30.3	43.29	19.20	30.3	34.61	30.38
31.2	58.89	14.44	31.2	56.51	4.15	31.3	12.91	41.33	31.3	41.89	19.28	31.3	34.45	30.62
32.2	58.44	14.39	32.2	56.04	4.11	32.3	11.33	41.38	32.3	40.50	19.35	32.3	34.29	30.85
16.96	+16.94		24.57	−24.55		58.93	+58.92		73.60	−73.59		7.41	+7.34	
17h	58m	22s.311	18h	7m	23s.343	19h	0m	15s.079	19h	30m	50s.769	20h	48m	32s.146
86°	36′	51″.04	−87°	39′	50″.89	+89°	1′	12″.80	−89°	13′	13″.35	+82°	13′	58″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Sept.	21 38	−83 5	Sept.	22 16	−86 22	Sept.	22 38	−81 48	Sept.	23 28	+86 51	Sept.	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
1.5	56.12	18.90	1.5	61.03	31.83	1.5	4.76	3.00	1.5	10.96	54.10	1.5	34.04	41.25
2.5	56.09	19.18	2.5	61.02	32.10	2.5	4.77	3.28	2.5	11.06	54.50	2.5	34.10	41.52
3.5	56.06	19.45	3.5	61.01	32.38	3.5	4.78	3.55	3.5	11.12	54.91	3.5	34.15	41.78
4.4	56.03	19.71	4.5	61.01	32.66	4.5	4.80	3.83	4.5	11.17	55.31	4.5	34.21	42.03
5.4	56.02	19.99	5.5	61.01	32.94	5.5	4.82	4.12	5.5	11.20	55.69	5.5	34.27	42.30
6.4	55.99	20.30	6.5	61.01	33.26	6.5	4.84	4.43	6.5	11.21	56.08	6.5	34.34	42.57
7.4	55.96	20.61	7.5	61.01	33.57	7.5	4.85	4.74	7.5	11.22	56.47	7.5	34.40	42.87
8.4	55.92	20.93	8.5	60.97	33.89	8.5	4.85	5.06	8.5	11.22	56.84	8.5	34.45	43.18
9.4	55.87	21.25	9.5	60.93	34.22	9.5	4.85	5.39	9.5	11.23	57.18	9.5	34.50	43.51
10.4	55.79	21.57	10.5	60.85	34.56	10.5	4.83	5.72	10.5	11.26	57.52	10.5	34.54	43.83
11.4	55.71	21.85	11.5	60.75	34.88	11.5	4.80	6.04	11.5	11.30	57.88	11.5	34.55	44.16
12.4	55.62	22.13	12.5	60.62	35.17	12.5	4.76	6.36	12.5	11.35	58.24	12.5	34.56	44.48
13.4	55.53	22.38	13.4	60.49	35.46	13.5	4.72	6.64	13.5	11.41	58.62	13.5	34.56	44.78
14.4	55.45	22.63	14.4	60.38	35.73	14.5	4.68	6.92	14.5	11.46	59.03	14.5	34.56	45.07
15.4	55.38	22.87	15.4	60.28	35.97	15.5	4.65	7.18	15.5	11.50	59.46	15.5	34.57	45.34
16.4	55.32	23.09	16.4	60.19	36.21	16.5	4.63	7.43	16.5	11.50	59.89	16.5	34.59	45.61
17.4	55.26	23.33	17.4	60.11	36.48	17.5	4.62	7.69	17.5	11.47	60.32	17.5	34.62	45.88
18.4	55.21	23.60	18.4	60.06	36.77	18.5	4.61	7.97	18.5	11.42	60.74	18.5	34.65	46.16
19.4	55.16	23.87	19.4	59.98	37.08	19.4	4.59	8.27	19.5	11.35	61.12	19.5	34.68	46.45
20.4	55.08	24.14	20.4	59.89	37.39	20.4	4.56	8.58	20.5	11.27	61.49	20.5	34.70	46.77
21.4	55.00	24.43	21.4	59.77	37.72	21.4	4.52	8.89	21.5	11.19	61.85	21.5	34.71	47.10
22.4	54.89	24.73	22.4	59.63	38.04	22.4	4.48	9.22	22.5	11.14	62.19	22.5	34.72	47.44
23.4	54.76	25.01	23.4	59.47	38.34	23.4	4.42	9.55	23.5	11.09	62.53	23.5	34.70	47.79
24.4	54.64	25.29	24.4	59.29	38.63	24.4	4.35	9.86	24.5	11.05	62.89	24.5	34.67	48.13
25.4	54.52	25.53	25.4	59.10	38.91	25.4	4.29	10.16	25.5	11.02	63.25	25.5	34.64	48.47
26.4	54.40	25.77	26.4	58.90	39.18	26.4	4.20	10.45	26.5	10.99	63.62	26.5	34.60	48.79
27.4	54.27	25.99	27.4	58.69	39.44	27.4	4.12	10.72	27.5	10.95	63.99	27.5	34.57	49.11
28.4	54.16	26.21	28.4	58.50	39.68	28.4	4.06	10.99	28.5	10.92	64.40	28.5	34.54	49.40
29.4	54.05	26.43	29.4	58.32	39.93	29.4	4.00	11.25	29.5	10.85	64.79	29.5	34.51	49.69
30.4	53.94	26.64	30.4	58.14	40.18	30.4	3.93	11.50	30.5	10.77	65.18	30.5	34.49	49.98
31.4	53.83	26.85	31.4	57.97	40.42	31.4	3.87	11.76	31.5	10.67	65.57	31.5	34.46	50.27
32.4	53.72	27.07	32.4	57.80	40.67	32.4	3.81	12.02	32.4	10.54	65.96	32.5	34.44	50.56
8.31		−8.25	15.82		−15.79	7.01		−6.94	18.29		+18.27	7.62		−7.56
21^h	38^m	$38^s.548$	22^h	16^m	$33^s.212$	22^h	37^m	$51^s.624$	23^h	27^m	$43^s.571$	23^h	47^m	$23^s.637$
−83°	5′	34″.33	−86°	22′	50″.92	−81°	48′	24″.80	+86°	51′	38″.62	−82°	28′	8″.42

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Oct.	0 57	+85 49	Oct.	1 32	+88 52	Oct.	1 42	−85 10	Oct.	4 11	+85 20	Oct.	5 36	+85 9
	s	″		s	″		s	″		s	″		s	″
0.5	53.60	41.37	0.5	57.87	32.96	0.5	1.99	22.09	0.6	6.54	19.69	0.7	13.57	14.68
1.5	53.67	41.76	1.5	58.31	33.34	1.5	2.07	22.38	1.6	6.84	19.92	1.7	13.89	14.76
2.5	53.73	42.16	2.5	58.69	33.73	2.5	2.15	22.66	2.6	7.12	20.14	2.7	14.21	14.85
3.5	53.77	42.55	3.5	59.02	34.11	3.5	2.24	22.95	3.6	7.39	20.39	3.7	14.52	14.96
4.5	53.80	42.94	4.5	59.29	34.50	4.5	2.32	23.24	4.6	7.63	20.63	4.7	14.81	15.09
5.5	53.81	43.31	5.5	59.52	34.88	5.5	2.40	23.55	5.6	7.87	20.87	5.7	15.10	15.20
6.5	53.82	43.69	6.5	59.76	35.24	6.5	2.46	23.88	6.6	8.11	21.10	6.7	15.37	15.31
7.5	53.85	44.03	7.5	60.01	35.58	7.5	2.53	24.22	7.6	8.34	21.29	7.7	15.64	15.41
8.5	53.88	44.38	8.5	60.31	35.92	8.5	2.57	24.57	8.6	8.57	21.50	8.7	15.92	15.50
9.5	53.92	44.72	9.5	60.66	36.25	9.5	2.58	24.91	9.6	8.82	21.70	9.7	16.19	15.56
10.5	53.98	45.09	10.5	61.04	36.60	10.5	2.59	25.25	10.6	9.08	21.90	10.7	16.47	15.62
11.5	54.04	45.46	11.5	61.46	36.97	11.5	2.58	25.59	11.6	9.36	22.12	11.7	16.80	15.70
12.5	54.10	45.86	12.5	61.85	37.35	12.5	2.57	25.90	12.6	9.64	22.35	12.7	17.12	15.79
13.5	54.14	46.27	13.5	62.19	37.76	13.5	2.57	26.19	13.6	9.93	22.58	13.7	17.45	15.91
14.5	54.16	46.70	14.5	62.46	38.18	14.5	2.57	26.47	14.6	10.21	22.85	14.7	17.77	16.05
15.5	54.17	47.12	15.5	62.63	38.61	15.5	2.59	26.75	15.6	10.46	23.14	15.7	18.09	16.23
16.5	54.14	47.53	16.5	62.73	39.01	16.5	2.62	27.04	16.6	10.70	23.44	16.7	18.39	16.39
17.5	54.09	47.91	17.5	62.76	39.39	17.5	2.65	27.35	17.6	10.91	23.73	17.7	18.67	16.56
18.5	54.04	48.29	18.5	62.76	39.77	18.5	2.66	27.67	18.6	11.11	24.01	18.7	18.92	16.73
19.5	54.00	48.63	19.5	62.77	40.14	19.5	2.67	28.01	19.6	11.31	24.28	19.7	19.17	16.87
20.5	53.96	48.96	20.5	62.81	40.48	20.5	2.66	28.37	20.6	11.50	24.53	20.7	19.41	17.05
21.5	53.94	49.29	21.5	62.90	40.82	21.5	2.63	28.74	21.6	11.69	24.78	21.7	19.65	17.20
22.5	53.93	49.62	22.5	63.00	41.17	22.5	2.60	29.11	22.6	11.89	25.00	22.6	19.91	17.34
23.5	53.92	49.98	23.5	63.14	41.53	23.5	2.56	29.45	23.6	12.09	25.23	23.6	20.17	17.46
24.5	53.91	50.32	24.5	63.27	41.89	24.5	2.49	29.80	24.6	12.32	25.49	24.6	20.44	17.60
25.4	53.88	50.69	25.5	63.37	42.25	25.5	2.43	30.13	25.6	12.53	25.76	25.6	20.72	17.74
26.4	53.85	51.06	26.5	63.47	42.62	26.5	2.36	30.45	26.6	12.75	26.03	26.6	20.99	17.92
27.4	53.82	51.44	27.5	63.52	43.00	27.5	2.30	30.77	27.6	12.97	26.31	27.6	21.27	18.09
28.4	53.78	51.82	28.5	63.50	43.39	28.5	2.24	31.06	28.6	13.19	26.62	28.6	21.55	18.27
29.4	53.72	52.21	29.5	63.44	43.80	29.5	2.19	31.36	29.6	13.39	26.93	29.6	21.83	18.47
30.4	53.63	52.59	30.5	63.32	44.19	30.5	2.14	31.65	30.6	13.58	27.24	30.6	22.10	18.70
31.4	53.53	52.96	31.5	63.14	44.58	31.5	2.09	31.94	31.6	13.76	27.58	31.6	22.35	18.94
	13.75	+13.72		51.04	+51.03		11.89	−11.84		12.31	+12.27		11.84	+11.80
	0h 57m 24s.633			1h 31m 11s.709			1h 41m 54s.846			4h 10m 37s.831			5h 35m 50s.330	
		+85° 49′ 24″.14			+88° 52′ 20″.55			−85° 10′ 45″.22			+85° 20′ 28″.88			+85° 9′ 34″.51

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT .

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Oct.	14 13	−83 18	Oct.	15 2	+87 32	Oct.	15 24	−84 12	Oct.	16 53	+82 10	Oct.	17 16	−80 47
	s	″		s	″		s	″		s	″		s	″
1.1	48.34	16.33	1.1	14.56	43.20	1.1	29.90	16.77	1.2	62.07	37.90	1.2	26.52	30.04
2.1	48.28	16.07	2.1	14.18	42.88	2.1	29.77	16.56	2.2	61.90	37.73	2.2	26.41	29.94
3.1	48.21	15.80	3.1	13.81	42.55	3.1	29.64	16.34	3.2	61.72	37.55	3.2	26.30	29.85
4.1	48.13	15.52	4.1	13.47	42.22	4.1	29.50	16.12	4.2	61.57	37.37	4.2	26.18	29.77
5.1	48.05	15.25	5.1	13.14	41.90	5.1	29.37	15.90	5.2	61.41	37.19	5.2	26.07	29.67
6.1	47.99	14.94	6.1	12.83	41.59	6.1	29.22	15.66	6.2	61.26	37.01	6.2	25.94	29.57
7.1	47.92	14.63	7.1	12.53	41.29	7.1	29.07	15.40	7.2	61.10	36.82	7.2	25.80	29.44
8.0	47.86	14.30	8.1	12.21	41.02	8.1	28.94	15.12	8.2	60.95	36.67	8.2	25.67	29.29
9.0	47.81	13.97	9.1	11.88	40.74	9.1	28.83	14.81	9.2	60.80	36.53	9.2	25.55	29.11
10.0	47.78	13.64	10.1	11.51	40.46	10.1	28.72	14.50	10.2	60.63	36.39	10.2	25.44	28.91
11.0	47.77	13.30	11.1	11.14	40.17	11.1	28.64	14.21	11.2	60.46	36.25	11.2	25.34	28.71
12.0	47.76	12.99	12.1	10.75	39.85	12.1	28.58	13.92	12.1	60.29	36.07	12.2	25.24	28.52
13.0	47.76	12.71	13.1	10.38	39.54	13.1	28.52	13.65	13.1	60.11	35.89	13.2	25.15	28.34
14.0	47.76	12.45	14.1	10.02	39.20	14.1	28.46	13.40	14.1	59.95	35.69	14.2	25.08	28.17
15.0	47.76	12.18	15.1	9.70	38.83	15.1	28.39	13.16	15.1	59.78	35.46	15.2	25.00	28.02
16.0	47.73	11.91	16.1	9.42	38.44	16.1	28.31	12.92	16.1	59.63	35.23	16.2	24.91	27.88
17.0	47.70	11.64	17.1	9.17	38.06	17.1	28.22	12.67	17.1	59.48	34.96	17.1	24.82	27.74
18.0	47.67	11.34	18.1	8.94	37.72	18.1	28.12	12.40	18.1	59.34	34.71	18.1	24.71	27.58
19.0	47.64	11.01	19.1	8.74	37.39	19.1	28.03	12.11	19.1	59.22	34.47	19.1	24.60	27.40
20.0	47.60	10.68	20.0	8.52	37.06	20.1	27.92	11.79	20.1	59.08	34.24	20.1	24.48	27.21
21.0	47.59	10.34	21.0	8.29	36.74	21.1	27.83	11.48	21.1	58.94	34.03	21.1	24.37	26.99
22.0	47.60	10.00	22.0	8.06	36.43	22.1	27.77	11.15	22.1	58.81	33.83	22.1	24.26	26.75
23.0	47.61	9.65	23.0	7.81	36.12	23.1	27.70	10.81	23.1	58.67	33.64	23.1	24.16	26.51
24.0	47.63	9.30	24.0	7.54	35.80	24.1	27.66	10.47	24.1	58.53	33.44	24.1	24.07	26.26
25.0	47.66	8.97	25.0	7.28	35.48	25.1	27.62	10.14	25.1	58.39	33.22	25.1	23.98	26.00
25.9	47.69	8.65	26.0	7.03	35.14	26.0	27.58	9.81	26.1	58.25	32.99	26.1	23.90	25.76
26.9	47.72	8.33	27.0	6.79	34.78	27.0	27.57	9.50	27.1	58.11	32.74	27.1	23.84	25.52
27.9	47.77	8.04	28.0	6.56	34.42	28.0	27.55	9.21	28.1	57.97	32.47	28.1	23.78	25.28
28.9	47.81	7.75	29.0	6.37	34.05	29.0	27.53	8.92	29.1	57.84	32.20	29.1	23.71	25.04
29.9	47.84	7.47	30.0	6.18	33.67	30.0	27.50	8.64	30.1	57.71	31.92	30.1	23.64	24.83
30.9	47.87	7.19	31.0	6.03	33.28	31.0	27.47	8.37	31.1	57.58	31.60	31.1	23.57	24.63
31.9	47.88	6.90	32.0	5.90	32.89	32.0	27.44	8.08	32.1	57.47	31.31	32.1	23.49	24.40
8.58		−8.52	23.34		+23.32	9.90		−9.85	7.35		+7.28	6.25		−6.17
14^h	13^m	$46^s.350$	15^h	3^m	$2^s.510$	15^h	24^m	$23^s.351$	16^h	54^m	$12^s.991$	17^h	16^m	$17^s.234$
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.27

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Oct.	17 57	+86 37	Oct.	18 7	−87 40	Oct.	18 58	+89 1	Oct.	19 31	−89 13	Oct.	20 48	+82 18
	s	″		s	″		s	″		s	″		s	″
1.2	58.89	14.44	1.2	56.51	4.15	1.3	72.91	41.33	1.3	101.89	19.28	1.3	34.45	[illegible]
2.2	58.44	14.39	2.2	56.04	4.11	2.3	71.33	41.38	2.3	100.50	19.35	2.3	34.29	[illegible]
3.2	58.00	14.33	3.2	55.57	4.09	3.3	69.77	41.42	3.3	99.11	19.43	3.3	34.14	[illegible]
4.2	57.57	14.24	4.2	55.07	4.08	4.3	68.23	41.43	4.3	97.67	19.52	4.3	33.98	[illegible]
5.2	57.15	14.16	5.2	54.55	4.04	5.3	66.73	41.45	5.3	96.16	19.60	5.3	33.82	31.44
6.2	56.75	14.06	6.2	54.01	4.00	6.3	65.28	41.45	6.3	94.58	19.67	6.3	33.66	[illegible]
7.2	56.36	13.98	7.2	53.46	3.95	7.2	63.90	41.48	7.3	92.91	19.72	7.3	33.52	[illegible]
8.2	55.97	13.92	8.2	52.91	3.86	8.2	62.51	41.51	8.3	91.20	19.77	8.3	33.37	[illegible]
9.2	55.57	13.87	9.2	52.36	3.74	9.2	61.14	41.55	9.3	89.48	19.78	9.3	33.23	[illegible]
10.2	55.16	13.84	10.2	51.84	3.60	10.2	59.73	41.62	10.3	87.79	19.78	10.3	33.09	[illegible]
11.2	54.74	13.80	11.2	51.36	3.46	11.2	58.25	41.68	11.3	86.18	19.74	11.3	32.94	[illegible]
12.2	54.31	13.74	12.2	50.92	3.32	12.2	56.70	41.74	12.3	84.66	19.70	12.3	32.79	[illegible]
13.2	53.85	13.66	13.2	50.49	3.20	13.2	55.09	41.79	13.3	83.24	19.67	13.3	32.62	[illegible]
14.2	53.39	13.57	14.2	50.09	3.07	14.2	53.44	41.79	14.3	81.88	19.66	14.3	32.45	[illegible]
15.2	52.95	13.45	15.2	49.69	2.96	15.2	51.78	41.79	15.2	80.54	19.64	15.3	32.28	[illegible]
16.2	52.52	13.31	16.2	49.26	2.86	16.2	50.17	41.75	16.2	79.14	19.63	16.3	32.10	[illegible]
17.2	52.10	13.16	17.2	48.80	2.77	17.2	48.62	41.70	17.2	77.67	19.64	17.3	31.93	33.74
18.2	51.72	13.01	18.2	48.32	2.67	18.2	47.15	41.65	18.2	76.11	19.65	18.3	31.76	33.84
19.2	51.34	12.86	19.2	47.81	2.55	19.2	45.73	41.60	19.2	74.45	19.66	19.3	31.58	33.94
20.2	50.97	12.73	20.2	47.29	2.42	20.2	44.38	41.55	20.2	72.73	19.64	20.3	31.43	34.05
21.2	50.61	12.60	21.2	46.77	2.26	21.2	43.04	41.51	21.2	70.98	19.60	21.3	31.27	34.16
22.2	50.25	12.49	22.2	46.26	2.08	22.2	41.70	41.47	22.2	69.24	19.52	22.3	31.12	[illegible]
23.2	49.88	12.38	23.2	45.78	1.88	23.2	40.34	41.46	23.2	67.53	19.42	23.3	30.98	34.46
24.2	49.50	12.27	24.2	45.32	1.67	24.2	38.94	41.44	24.2	65.88	19.32	24.3	30.82	34.57
25.2	49.11	12.14	25.2	44.90	1.45	25.2	37.50	41.41	25.2	64.30	19.22	25.3	30.65	34.72
26.2	48.72	12.02	26.2	44.48	1.24	26.2	36.01	41.38	26.2	62.78	19.13	26.3	30.48	34.87
27.2	48.31	11.87	27.2	44.10	1.04	27.2	34.51	41.33	27.2	61.32	19.04	27.3	30.31	35.00
28.1	47.92	11.69	28.2	43.72	0.85	28.2	32.99	41.28	28.2	59.90	18.95	28.3	30.14	35.10
29.1	47.53	11.51	29.2	43.35	0.66	29.2	31.46	41.20	29.2	58.50	18.87	29.3	29.96	35.19
30.1	47.14	11.33	30.2	42.99	0.48	30.2	29.95	41.11	30.2	57.12	18.78	30.3	29.78	35.28
31.1	46.77	11.13	31.1	42.61	0.31	31.2	28.47	41.00	31.2	55.74	18.70	31.3	29.59	35.35
32.1	46.41	10.90	32.1	42.22	0.12	32.2	27.02	40.87	32.2	54.30	18.62	32.3	29.41	35.40
16.96	+16.93		24.57	−24.55		58.97	+58.96		73.66	−73.65		7.41	+7.34	
17^h 58^m $22^s.311$			18^h 7^m $23^s.343$			19^h 0^m $15^s.079$			19^h 30^m $50^s.769$			20^h 48^m $32^s.146$		
+86° 36′ 51″.04			−87° 39′ 50″.89			+89° 1′ 12″.80			−89° 13′ 13″.35			+82° 18′ 56″.82		

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			ν Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ¹ Octantis. Mag. 5.1		
ash. ean me.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
t.	21 38	−83 5	Oct.	22 16	−86 22	Oct.	22 38	−81 48	Oct.	23 28	+86 52	Oct.	23 47	−82 27
	s	″		s	″		s	″		s	″		s	″
1.4	53.83	26.85	1.4	57.97	40.42	1.4	3.87	11.76	1.5	10.67	5.57	1.5	34.46	50.27
2.4	53.72	27.07	2.4	57.80	40.67	2.4	3.81	12.02	2.4	10.54	5.96	2.5	34.44	50.56
3.4	53.62	27.29	3.4	57.63	40.92	3.4	3.76	12.28	3.4	10.40	6.34	3.5	34.43	50.86
4.4	53.51	27.53	4.4	57.47	41.18	4.4	3.69	12.56	4.4	10.25	6.71	4.5	34.40	51.16
5.4	53.38	27.76	5.4	57.29	41.44	5.4	3.63	12.84	5.4	10.09	7.05	5.5	34.38	51.48
6.4	53.26	28.00	6.4	57.09	41.71	6.4	3.55	13.12	6.4	9.94	7.39	6.5	34.34	51.79
7.4	53.12	28.23	7.4	56.86	41.97	7.4	3.46	13.41	7.4	9.79	7.73	7.4	34.29	52.12
8.4	52.98	28.45	8.4	56.62	42.23	8.4	3.36	13.70	8.4	9.67	8.07	8.4	34.23	52.46
9.4	52.82	28.64	9.4	56.34	42.47	9.4	3.25	13.96	9.4	9.57	8.43	9.4	34.15	52.77
0.4	52.66	28.82	10.4	56.06	42.69	10.4	3.14	14.19	10.4	9.47	8.79	10.4	34.07	53.07
1.3	52.50	28.96	11.4	55.79	42.89	11.4	3.04	14.41	11.4	9.37	9.16	11.4	33.99	53.35
2.3	52.35	29.10	12.4	55.53	43.07	12.4	2.94	14.61	12.4	9.25	9.54	12.4	33.92	53.63
3.3	52.21	29.22	13.4	55.29	43.24	13.4	2.84	14.80	13.4	9.11	9.93	13.4	33.86	53.87
4.3	52.08	29.35	14.4	55.06	43.41	14.4	2.75	15.00	14.4	8.93	10.33	14.4	33.80	54.11
5.3	51.96	29.48	15.4	54.84	43.60	15.4	2.67	15.20	15.4	8.74	10.71	15.4	33.74	54.38
6.3	51.84	29.66	16.4	54.63	43.80	16.4	2.60	15.43	16.4	8.51	11.06	16.4	33.69	54.65
7.3	51.70	29.83	17.4	54.40	44.01	17.4	2.51	15.66	17.4	8.28	11.40	17.4	33.63	54.94
8.3	51.56	30.00	18.4	54.16	44.23	18.4	2.41	15.90	18.4	8.04	11.72	18.4	33.57	55.23
9.3	51.39	30.19	19.4	53.89	44.46	19.4	2.29	16.15	19.4	7.81	12.02	19.4	33.49	55.53
0.3	51.23	30.37	20.3	53.60	44.69	20.4	2.17	16.39	20.4	7.61	12.33	20.4	33.41	55.84
1.3	51.05	30.52	21.3	53.28	44.90	21.4	2.05	16.64	21.4	7.42	12.63	21.4	33.31	56.15
2.3	50.87	30.66	22.3	52.95	45.09	22.4	1.91	16.85	22.4	7.24	12.94	22.4	33.20	56.44
3.3	50.69	30.78	23.3	52.62	45.27	23.4	1.77	17.04	23.4	7.05	13.26	23.4	33.08	56.71
4.3	50.50	30.88	24.3	52.30	45.41	24.4	1.64	17.23	24.4	6.87	13.58	24.4	32.97	56.98
5.3	50.33	30.97	25.3	51.98	45.55	25.4	1.52	17.40	25.4	6.69	13.90	25.4	32.86	57.24
6.3	50.16	31.04	26.3	51.66	45.68	26.3	1.39	17.55	26.4	6.47	14.21	26.4	32.75	57.48
7.3	49.99	31.12	27.3	51.37	45.80	27.3	1.26	17.70	27.4	6.25	14.54	27.4	32.65	57.71
8.3	49.84	31.20	28.3	51.07	45.92	28.3	1.15	17.85	28.4	6.01	14.87	28.4	32.54	57.93
9.3	49.69	31.28	29.3	50.79	46.04	29.3	1.03	18.01	29.4	5.74	15.20	29.4	32.44	58.15
0.3	49.54	31.36	30.3	50.51	46.16	30.3	0.91	18.16	30.4	5.47	15.52	30.4	32.35	58.38
1.3	49.39	31.45	31.3	50.24	46.29	31.3	0.80	18.33	31.4	5.17	15.83	31.4	32.26	58.60
2.3	49.24	31.53	32.3	49.95	46.41	32.3	0.68	18.50	32.4	4.87	16.11	32.4	32.16	58.83
	8.31	−8.25		15.83	−15.80		7.02	−6.94		18.31	+18.29		7.63	−7.56
21ʰ	38ᵐ	38ˢ.548	22ʰ	16ᵐ	33ˢ.212	22ʰ	37ᵐ	51ˢ.624	23ʰ	27ᵐ	43ˢ.571	23ʰ	47ᵐ	23ˢ.637
83°	5′	34″.33	−86°	22′	50″.92	−81°	48′	24″.80	+86°	51′	38″.62	−82°	28′	8″.42

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensæ. Mag. 6.2			ζ Mensæ. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Nov.	5 45	−84 49	Nov.	6 46	−80 43	Nov.	7 3	+87 10	Nov.	7 14	+82 33	Nov.	7 15	−86 54
	s	″		s	″		s	″		s	″		s	″
0.6	48.37	33.30	0.7	47.52	37.56	0.7	43.17	15.66	0.7	24.80	48.48	0.7	28.27	13.16
1.6	48.54	33.53	1.7	47.64	37.72	1.7	43.66	15.76	1.7	25.00	48.56	1.7	28.63	13.29
2.6	48.71	33.76	2.7	47.76	37.88	2.7	44.14	15.87	2.7	25.18	48.65	2.7	29.00	13.42
3.6	48.89	34.00	3.7	47.89	38.07	3.7	44.60	15.98	3.7	25.36	48.73	3.7	29.39	13.56
4.6	49.07	34.27	4.7	48.01	38.29	4.7	45.03	16.08	4.7	25.53	48.79	4.7	29.79	13.72
5.6	49.24	34.55	5.7	48.13	38.51	5.7	45.48	16.17	5.7	25.70	48.85	5.7	30.18	13.90
6.6	49.39	34.87	6.7	48.26	38.74	6.7	45.93	16.22	6.7	25.89	48.89	6.7	30.56	14.11
7.6	49.53	35.18	7.7	48.36	39.02	7.7	46.40	16.29	7.7	26.07	48.93	7.7	30.91	14.34
8.6	49.66	35.49	8.6	48.47	39.30	8.7	46.91	16.37	8.7	26.27	48.96	8.7	31.24	14.57
9.6	49.77	35.81	9.6	48.57	39.54	9.7	47.44	16.45	9.7	26.48	49.01	9.7	31.55	14.79
10.6	49.88	36.10	10.6	48.67	39.78	10.7	47.99	16.54	10.7	26.71	49.10	10.7	31.84	15.00
11.6	49.99	36.38	11.6	48.77	40.02	11.7	48.52	16.67	11.7	26.92	49.23	11.7	32.13	15.20
12.6	50.10	36.62	12.6	48.86	40.25	12.7	49.03	16.83	12.7	27.12	49.35	12.7	32.41	15.39
13.6	50.23	36.89	13.6	48.95	40.47	13.6	49.52	17.01	13.7	27.32	49.50	13.7	32.72	15.56
14.6	50.36	37.15	14.6	49.05	40.69	14.6	49.97	17.20	14.7	27.50	49.65	14.7	33.03	15.74
15.6	50.50	37.43	15.6	49.16	40.92	15.6	50.40	17.37	15.7	27.67	49.80	15.7	33.35	15.94
16.6	50.63	37.74	16.6	49.26	41.18	16.6	50.79	17.54	16.6	27.82	49.95	16.6	33.69	16.14
17.6	50.76	38.05	17.6	49.37	41.44	17.6	51.17	17.69	17.6	27.98	50.08	17.6	34.05	16.37
18.6	50.87	38.38	18.6	49.47	41.73	18.6	51.56	17.84	18.6	28.13	50.20	18.6	34.39	16.61
19.6	50.98	38.72	19.6	49.57	42.05	19.6	51.97	17.98	19.6	28.28	50.32	19.6	34.71	16.89
20.6	51.08	39.08	20.6	49.66	42.37	20.6	52.37	18.12	20.6	28.46	50.43	20.6	35.01	17.17
21.6	51.17	39.44	21.6	49.76	42.69	21.6	52.79	18.26	21.6	28.63	50.54	21.6	35.30	17.45
22.6	51.23	39.79	22.6	49.85	43.00	22.6	53.23	18.41	22.6	28.80	50.67	22.6	35.58	17.74
23.6	51.30	40.12	23.6	49.92	43.32	23.6	53.67	18.58	23.6	28.98	50.80	23.6	35.83	18.02
24.6	51.37	40.45	24.6	50.00	43.64	24.6	54.12	18.75	24.6	29.16	50.95	24.6	36.07	18.30
25.6	51.44	40.78	25.6	50.06	43.92	25.6	54.56	18.95	25.6	29.34	51.13	25.6	36.30	18.56
26.6	51.50	41.10	26.6	50.13	44.22	26.6	54.99	19.17	26.6	29.53	51.31	26.6	36.53	18.81
27.6	51.55	41.41	27.6	50.20	44.51	27.6	55.41	19.40	27.6	29.70	51.51	27.6	36.76	19.06
28.6	51.62	41.72	28.6	50.27	44.79	28.6	55.79	19.63	28.6	29.85	51.71	28.6	36.98	19.32
29.6	51.68	42.03	29.6	50.35	45.07	29.6	56.17	19.86	29.6	30.00	51.92	29.6	37.22	19.57
30.5	51.75	42.35	30.6	50.43	45.38	30.6	56.51	20.10	30.6	30.15	52.13	30.6	37.46	19.84
31.5	51.82	42.67	31.6	50.49	45.69	31.6	56.83	20.34	31.6	30.28	52.34	31.6	37.71	20.12
	11.09	−11.05		6.21	−6.13		20.26	+20.24		7.73	+7.66		18.52	−18.49
5^h	45^m	$51^s.396$	6^h	46^m	$48^s.653$	7^h	3^m	$2^s.335$	7^h	14^m	$7^s.912$	7^h	15^m	$39^s.691$
−84°	49′	44″.27	−80°	43′	46″.14	+87°	10′	43″.86	+82°	34′	17″.32	−86°	54′	19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Nov.	8 18	+88 52	Nov.	9 8	−85 20	Nov.	9 25	+81 40	Nov.	9 36	−80 34	Nov.	10 21	+82 57
	s	″		s	″		s	″		s	″		s	″
0.7	48.99	2.03	0.8	33.82	26.49	0.8	45.37	31.90	0.8	16.99	40.26	0.8	21.30	38.92
1.7	50.28	2.02	1.8	34.08	26.45	1.8	45.54	31.77	1.8	17.11	40.19	1.8	21.48	38.73
2.7	51.52	2.01	2.8	34.35	26.41	2.8	45.69	31.65	2.8	17.24	40.12	2.8	21.66	38.54
3.7	52.70	2.00	3.8	34.62	26.40	3.8	45.85	31.53	3.8	17.37	40.06	3.8	21.82	38.34
4.7	53.83	2.00	4.8	34.91	26.40	4.8	46.01	31.39	4.8	17.52	40.02	4.8	21.98	38.15
5.7	54.96	1.97	5.8	35.20	26.42	5.8	46.15	31.26	5.8	17.67	40.01	5.8	22.13	37.95
6.7	56.12	1.94	6.8	35.52	26.47	6.8	46.30	31.12	6.8	17.82	40.04	6.8	22.29	37.72
7.7	57.32	1.88	7.8	35.82	26.53	7.8	46.46	30.97	7.8	17.97	40.07	7.8	22.44	37.50
8.7	58.58	1.82	8.7	36.10	26.61	8.8	46.63	30.80	8.8	18.13	40.12	8.8	22.62	37.27
9.7	59.92	1.78	9.7	36.38	26.69	9.8	46.81	30.63	9.8	18.28	40.19	9.8	22.81	37.02
10.7	61.30	1.77	10.7	36.62	26.78	10.8	47.00	30.48	10.8	18.42	40.26	10.8	23.00	36.78
11.7	62.69	1.77	11.7	36.87	26.85	11.8	47.20	30.35	11.8	18.55	40.30	11.8	23.23	36.57
12.7	64.06	1.82	12.7	37.11	26.90	12.8	47.39	30.25	12.8	18.68	40.34	12.8	23.43	36.38
13.7	65.39	1.88	13.7	37.36	26.95	13.7	47.58	30.18	13.8	18.81	40.35	13.8	23.63	36.23
14.7	66.65	1.94	14.7	37.62	26.99	14.7	47.76	30.12	14.8	18.94	40.37	14.8	23.83	36.09
15.7	67.83	2.00	15.7	37.89	27.03	15.7	47.94	30.07	15.7	19.07	40.40	15.8	24.02	35.96
16.7	68.95	2.07	16.7	38.17	27.08	16.7	48.09	30.02	16.7	19.21	40.43	16.8	24.19	35.83
17.7	70.03	2.14	17.7	38.46	27.18	17.7	48.24	29.98	17.7	19.37	40.48	17.8	24.36	35.71
18.7	71.11	2.19	18.7	38.75	27.27	18.7	48.40	29.92	18.7	19.52	40.54	18.8	24.53	35.57
19.7	72.19	2.23	19.7	39.05	27.40	19.7	48.55	29.86	19.7	19.67	40.62	19.8	24.71	35.43
20.7	73.31	2.27	20.7	39.34	27.53	20.7	48.70	29.79	20.7	19.82	40.71	20.8	24.88	35.29
21.7	74.46	2.32	21.7	39.61	27.69	21.7	48.87	29.71	21.7	19.97	40.83	21.8	25.06	35.15
22.7	75.65	2.36	22.7	39.89	27.85	22.7	49.05	29.63	22.7	20.12	40.96	22.8	25.24	34.99
23.7	76.86	2.42	23.7	40.14	27.99	23.7	49.22	29.57	23.7	20.26	41.09	23.8	25.45	34.85
24.7	78.10	2.50	24.7	40.39	28.14	24.7	49.40	29.53	24.7	20.40	41.22	24.8	25.65	34.72
25.7	79.35	2.58	25.7	40.64	28.30	25.7	49.59	29.49	25.7	20.53	41.35	25.8	25.85	34.60
26.7	80.60	2.68	26.7	40.87	28.45	26.7	49.78	29.47	26.7	20.66	41.49	26.8	26.06	34.49
27.7	81.82	2.80	27.7	41.11	28.60	27.7	49.97	29.46	27.7	20.79	41.60	27.7	26.28	34.39
28.7	83.00	2.93	28.7	41.34	28.75	28.7	50.15	29.48	28.7	20.91	41.71	28.7	26.50	34.34
29.7	84.13	3.07	29.7	41.58	28.88	29.7	50.32	29.51	29.7	21.04	41.82	29.7	26.70	34.28
30.7	85.19	3.21	30.7	41.83	29.02	30.7	50.47	29.54	30.7	21.18	41.94	30.7	26.88	34.23
31.7	86.20	3.35	31.7	42.09	29.19	31.7	50.63	29.57	31.7	21.31	42.08	31.7	27.07	34.18
	50.58	+50.57		12.31	−12.27		6.91	+6.83		6.11	−6.03		8.16	+8.10
8^h	17^m	$47^s.546$	9^h	8^m	$41^s.594$	9^h	25^m	$39^s.275$	9^h	36^m	$19^s.026$	10^h	21^m	$19^s.949$
+88°	52′	37″.80	−85°	20′	26″.78	+81°	41′	10″.13	−80°	34′	39″.26	+82°	58′	17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3			Bradley 1672. Mag. 6.3			ι Octantis. Mag. 5.4			32 H. Camelop. seq. Mag. 5.3			κ Octantis. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Nov.	10 59	−84 9	Nov.	12 13	+88 8	Nov.	12 46	−84 41	Nov.	12 48	+83 50	Nov.	13 27	−85 22
	s	″		s	″		s	″		s	″		s	″
0.8	50.12	35.20	0.9	47.42	23.16	0.9	16.96	12.04	0.9	18.14	42.40	0.9	31.55	31.25
1.8	50.29	35.03	1.9	47.82	22.83	1.9	17.06	11.78	1.9	18.24	42.04	1.9	31.63	30.96
2.8	50.47	34.86	2.9	48.21	22.52	2.9	17.19	11.50	2.9	18.32	41.70	2.9	31.72	30.65
3.8	50.65	34.68	3.9	48.59	22.23	3.9	17.32	11.22	3.9	18.41	41.37	3.9	31.82	30.34
4.8	50.86	34.51	4.9	48.93	21.93	4.9	17.46	10.93	4.9	18.48	41.04	4.9	31.94	30.01
5.8	51.08	34.38	5.9	49.25	21.62	5.9	17.63	10.65	5.9	18.56	40.71	5.9	32.08	29.70
6.8	51.30	34.24	6.9	49.54	21.30	6.9	17.80	10.41	6.9	18.62	40.37	6.9	32.25	29.41
7.8	51.54	34.14	7.9	49.84	20.96	7.9	18.00	10.18	7.9	18.68	40.04	7.9	32.43	29.14
8.8	51.76	34.08	8.9	50.16	20.62	8.9	18.19	9.97	8.9	18.76	39.66	8.9	32.62	28.88
9.8	51.98	34.02	9.9	50.53	20.25	9.9	18.39	9.76	9.9	18.85	39.28	9.9	32.80	28.64
10.8	52.18	33.96	10.9	50.95	19.91	10.9	18.57	9.57	10.9	18.95	38,89	10.9	32.98	28.43
11.8	52.38	33.90	11.9	51.42	19.56	11.9	18.75	9.40	11.9	19.07	38.50	11.9	33.14	28.21
12.8	52.57	33.81	12.9	51.93	19.23	12.9	18.89	9.22	12.9	19.20	38.14	12.9	33.28	27.98
13.8	52.76	33.73	13.9	52.46	18.93	13.9	19.04	9.02	13.9	19.34	37.80	13.9	33.42	27.74
14.8	52.96	33.63	14.9	52.99	18.65	14.9	19.21	8.79	14.9	19.47	37.47	14.9	33.56	27.50
15.8	53.17	33.53	15.9	53.49	18.39	15.9	19.38	8.56	15.9	19.60	37.16	15.9	33.71	27.22
16.8	53.39	33.43	16.9	53.96	18.15	16.9	19.55	8.33	16.9	19.73	36.87	16.9	33.88	26.95
17.8	53.61	33.34	17.9	54.40	17.90	17.9	19.74	8.11	17.9	19.83	36.59	17.9	34.06	26.68
18.8	53.84	33.27	18.9	54.83	17.63	18.9	19.94	7.88	18.9	19.94	36.30	18.9	34.25	26.40
19.8	54.08	33.22	19.8	55.26	17.37	19.9	20.17	7.67	19.9	20.05	36.01	19.9	34.48	26.15
20.8	54.33	33.19	20.8	55.70	17.11	20.9	20.39	7.47	20.9	20.16	35.71	20.9	34.70	25.90
21.8	54.58	33.18	21.8	56.15	16.83	21.9	20.62	7.31	21.9	20.28	35.42	21.9	34.93	25.68
22.8	54.81	33.18	22.8	56.61	16.55	22.9	20.85	7.16	22.9	20.41	35.10	22.9	35.16	25.48
23.8	55.05	33.19	23.8	57.12	16.27	23.9	21.07	7.01	23.9	20.55	34.77	23.9	35.39	25.28
24.8	55.28	33.20	24.8	57.66	16.00	24.9	21.29	6.87	24.9	20.69	34.45	24.9	35.62	25.09
25.8	55.50	33.20	25.8	58.22	15.75	25.9	21.51	6.74	25.9	20.84	34.14	25.9	35.82	24.92
26.8	55.69	33.21	26.8	58.82	15.50	26.9	21.71	6.61	26.9	21.01	33.83	26.9	36.03	24.74
27.8	55.90	33.22	27.8	59.43	15.25	27.8	21.92	6.48	27.8	21.18	33.54	27.9	36.24	24.57
28.8	56.11	33.22	28.8	60.06	15.03	28.8	22.11	6.34	28.8	21.35	33.26	28.9	36.44	24.39
29.8	56.33	33.21	29.8	60.68	14.83	29.8	22.31	6.19	29.8	21.53	33.01	29.9	36.65	24.19
30.8	56.55	33.21	30.8	61.29	14.62	30.8	22.53	6.05	30.8	21.69	32.76	30.9	36.87	23.99
31.8	56.78	33.21	31.8	61.85	14.43	31.8	22.75	5.90	31.8	21.84	32.52	31.9	37.10	23.79
9.83		−9.78	30.78		+30.77	10.80		−10.75	9.32		+9.27	12.40		−12.36
10^h	59^m	$54^s.546$	12^h	14^m	$29^s.190$	12^h	46^m	$19^s.119$	12^h	48^m	$31^s.308$	13^h	27^m	$32^s.891$
−84°	9′	29″.33	+88°	8′	56″.19	−84°	41′	1″.57	+83°	51′	11″.30	−85°	22′	19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursae Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Nov.	14 13	−83 17	Nov.	15 2	+87 32	Nov.	15 24	−84 11	Nov.	16 53	+82 10	Nov.	17 16	[illegible]
	s	″		s	″		s	″		s	″		s	″
0.9	47.88	66.90	1.0	5.90	32.89	1.0	27.44	68.08	1.1	57.47	31.31	1.1	23.49	[illegible]
1.9	47.91	66.59	2.0	5.80	32.53	2.0	27.40	67.78	2.1	57.36	31.01	2.1	23.41	[illegible]
2.9	47.94	66.28	3.0	5.70	32.17	3.0	27.36	67.46	3.1	57.25	30.72	3.1	23.33	[illegible]
3.9	47.97	65.96	4.0	5.60	31.83	4.0	27.33	67.12	4.1	57.15	30.45	4.1	23.25	[illegible]
4.9	48.01	65.64	5.0	5.47	31.49	5.0	27.32	66.78	5.1	57.04	30.18	5.1	23.17	[illegible]
5.9	48.07	65.30	6.0	5.33	31.15	6.0	27.32	66.44	6.1	56.93	29.92	6.1	23.11	[illegible]
6.9	48.15	64.97	6.9	5.18	30.83	7.0	27.35	66.09	7.1	56.82	29.67	7.1	23.05	[illegible]
7.9	48.25	64.65	7.9	5.00	30.48	8.0	27.38	65.76	8.1	56.69	29.42	8.1	23.00	[illegible]
8.9	48.35	64.37	8.9	4.84	30.11	9.0	27.43	65.44	9.1	56.57	29.15	9.1	22.97	[illegible]
9.9	48.45	64.10	9.9	4.69	29.74	10.0	27.49	65.14	10.1	56.46	28.85	10.1	22.96	[illegible]
10.9	48.55	63.85	10.9	4.57	29.33	11.0	27.54	64.85	11.1	56.35	28.53	11.1	22.92	[illegible]
11.9	48.64	63.61	11.9	4.48	28.92	12.0	27.58	64.59	12.1	56.24	28.19	12.1	22.90	[illegible]
12.9	48.70	63.38	12.9	4.44	28.52	12.9	27.61	64.31	13.1	56.14	27.85	13.1	22.86	[illegible]
13.9	48.77	63.11	13.9	4.43	28.13	13.9	27.63	64.04	14.1	56.06	27.50	14.1	22.82	[illegible]
14.9	48.84	62.85	14.9	4.44	27.74	14.9	27.64	63.74	15.1	55.98	27.15	15.1	22.78	[illegible]
15.9	48.90	62.56	15.9	4.45	27.40	15.9	27.65	63.42	16.1	55.91	26.82	16.1	22.72	[illegible]
16.9	48.99	62.25	16.9	4.47	27.05	16.9	27.68	63.08	17.0	55.83	26.52	17.1	22.67	[illegible]
17.9	49.08	61.93	17.9	4.47	26.72	17.9	27.71	62.74	18.0	55.77	26.23	18.1	22.62	[illegible]
18.9	49.19	61.62	18.9	4.46	26.40	18.9	27.76	62.39	19.0	55.69	25.93	19.1	22.58	[illegible]
19.9	49.32	61.33	19.9	4.43	26.07	19.9	27.84	62.04	20.0	55.61	25.64	20.1	22.55	[illegible]
20.9	49.44	61.04	20.9	4.40	25.73	20.9	27.92	61.71	21.0	55.54	25.35	21.1	22.54	[illegible]
21.9	49.56	60.77	21.9	4.39	25.38	21.9	28.00	61.39	22.0	55.46	25.03	22.1	22.52	[illegible]
22.9	49.70	60.53	22.9	4.38	25.01	22.9	28.10	61.10	23.0	55.38	24.71	23.0	22.51	[illegible]
23.9	49.83	60.29	23.9	4.39	24.65	23.9	28.20	60.80	24.0	55.31	24.38	24.0	22.51	[illegible]
24.9	49.96	60.06	24.9	4.42	24.27	24.9	28.29	60.51	25.0	55.24	24.02	25.0	22.52	[illegible]
25.9	50.10	59.83	25.9	4.47	23.90	25.9	28.39	60.24	26.0	55.18	23.65	26.0	22.52	[illegible]
26.9	50.22	59.64	26.9	4.55	23.51	26.9	28.48	59.97	27.0	55.13	23.28	27.0	22.51	[illegible]
27.9	50.35	59.41	27.9	4.65	23.12	27.9	28.57	59.71	28.0	55.08	22.90	28.0	22.51	[illegible]
28.9	50.47	59.19	28.9	4.78	22.75	28.9	28.65	59.44	29.0	55.04	22.52	29.0	22.50	[illegible]
29.9	50.59	58.97	29.9	4.92	22.39	29.9	28.72	59.16	30.0	55.00	22.15	30.0	22.49	[illegible]
30.9	50.71	58.73	30.9	5.07	22.06	30.9	28.81	58.87	31.0	54.97	21.82	31.0	22.48	[illegible]
31.9	50.83	58.48	31.9	5.20	21.73	31.9	28.90	58.56	32.0	54.94	21.48	32.0	22.47	[illegible]
8.57		−8.51	23.31		+23.29	9.90		−9.85	7.34		+7.28	6.25		−6.17
14^h	13^m	$46^s.350$	15^h	3^m	$2^s.510$	15^h	24^m	$23^s.351$	16^h	54^m	$12^s.991$	17^h	16^m	$17^s.$[illegible]
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.[illegible]

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursæ Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursæ Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Nov.	17 57	+86 37	Nov.	18 7	−87 39	Nov.	18 57	+89 1	Nov.	19 31	−89 13	Nov.	20 48	+82 14
	s	″		s	″		s	″		s	″		s	″
1.1	46.41	10.90	1.1	42.22	60.12	1.2	87.02	40.87	1.2	54.30	18.62	1.3	29.41	35.40
2.1	46.07	10.68	2.1	41.81	59.93	2.2	85.64	40.73	2.2	52.81	18.53	2.3	29.24	35.45
3.1	45.74	10.46	3.1	41.39	59.74	3.2	84.32	40.60	3.2	51.24	18.42	3.3	29.07	35.48
4.1	45.42	10.26	4.1	40.96	59.51	4.2	83.05	40.50	4.2	49.65	18.30	4.2	28.90	35.51
5.1	45.10	10.07	5.1	40.54	59.25	5.2	81.79	40.40	5.2	48.04	18.16	5.2	28.75	35.56
6.1	44.78	9.90	6.1	40.15	58.98	6.2	80.51	40.30	6.2	46.47	17.98	6.2	28.59	35.62
7.1	44.44	9.73	7.1	39.80	58.70	7.2	79.19	40.25	7.2	44.98	17.79	7.2	28.43	35.70
8.1	44.08	9.56	8.1	39.49	58.41	8.2	77.81	40.17	8.2	43.59	17.58	8.2	28.26	35.79
9.1	43.72	9.39	9.1	39.23	58.12	9.2	76.37	40.08	9.2	42.34	17.39	9.2	28.09	35.85
10.1	43.34	9.17	10.1	38.99	57.87	10.2	74.88	39.97	10.2	41.17	17.20	10.2	27.91	35.91
11.1	42.98	8.93	11.1	38.77	57.63	11.2	73.37	39.83	11.2	40.05	17.01	11.2	27.73	35.96
12.1	42.63	8.66	12.1	38.54	57.40	12.1	71.90	39.66	12.2	38.93	16.84	12.2	27.55	35.98
13.1	42.30	8.39	13.1	38.27	57.17	13.1	70.51	39.48	13.2	37.77	16.69	13.2	27.36	35.97
14.1	42.00	8.11	14.1	37.98	56.93	14.1	69.19	39.29	14.2	36.52	16.53	14.2	27.18	35.94
15.1	41.72	7.83	15.1	37.66	56.69	15.1	67.96	39.09	15.2	35.18	16.38	15.2	27.00	35.90
16.1	41.45	7.57	16.1	37.33	56.41	16.1	66.81	38.90	16.2	33.79	16.20	16.2	26.83	35.86
17.1	41.21	7.32	17.1	37.00	56.13	17.1	65.69	38.73	17.2	32.37	16.01	17.2	26.68	35.82
18.1	40.95	7.09	18.1	36.70	55.84	18.1	64.59	38.58	18.2	30.95	15.79	18.2	26.52	35.80
19.1	40.69	6.87	19.1	36.41	55.52	19.1	63.49	38.43	19.2	29.58	15.55	19.2	26.37	35.79
20.1	40.42	6.65	20.1	36.15	55.20	20.1	62.37	38.28	20.2	28.27	15.32	20.2	26.21	35.76
21.1	40.16	6.42	21.1	35.91	54.88	21.1	61.21	38.11	21.1	27.04	15.07	21.2	26.06	35.74
22.1	39.88	6.18	22.1	35.71	54.56	22.1	60.02	37.94	22.1	25.89	14.80	22.2	25.89	35.73
23.1	39.61	5.92	23.1	35.54	54.24	23.1	58.81	37.77	23.1	24.83	14.55	23.2	25.72	35.72
24.1	39.34	5.64	24.1	35.39	53.93	24.1	57.59	37.58	24.1	23.82	14.30	24.2	25.56	35.68
25.1	39.06	5.36	25.1	35.24	53.63	25.1	56.37	37.36	25.1	22.86	14.06	25.2	25.39	35.63
26.1	38.79	5.05	26.1	35.11	53.34	26.1	55.17	37.14	26.1	21.93	13.82	26.2	25.21	35.54
27.1	38.55	4.74	27.1	34.97	53.06	27.1	54.00	36.90	27.1	21.00	13.58	27.2	25.04	35.46
28.1	38.32	4.43	28.1	34.82	52.78	28.1	52.87	36.65	28.1	20.07	13.35	28.2	24.87	35.36
29.1	38.11	4.11	29.1	34.64	52.50	29.1	51.82	36.40	29.1	19.10	13.11	29.2	24.70	35.25
30.1	37.91	3.79	30.1	34.47	52.21	30.1	50.83	36.15	30.1	18.07	12.87	30.2	24.55	35.12
31.1	37.73	3.48	31.1	34.29	51.89	31.1	49.90	35.90	31.1	17.00	12.61	31.2	24.39	34.99
32.1	37.55	3.19	32.1	34.11	51.57	32.1	49.02	35.66	32.1	15.92	12.33	32.2	24.24	34.88

δ Ursæ Minoris	χ Octantis	λ Ursæ Minoris	σ Octantis	76 Draconis
16.96 +16.93	24.55 −24.53	58.92 +58.91	73.57 −73.57	7.41 +7.34
17h 58m 22s.311	18h 7m 23s.343	19h 0m 15s.079	19h 30m 50s.769	20h 48m 32s.146
+86° 36′ 51″.04	−87° 39′ 50″.89	+89° 1′ 12″.80	−89° 13′ 13″.35	+82° 13′ 56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Nov.	21 38	−83 5
	s	″
1.3	49.24	31.53
2.3	49.07	31.62
3.3	48.88	31.72
4.3	48.70	31.80
5.3	48.51	31.85
6.3	48.32	31.89
7.3	48.12	31.89
8.3	47.94	31.88
9.3	47.77	31.84
10.3	47.62	31.82
11.3	47.47	31.81
12.3	47.32	31.80
13.3	47.17	31.81
14.3	47.01	31.82
15.3	46.84	31.83
16.2	46.66	31.85
17.2	46.46	31.85
18.2	46.27	31.82
19.2	46.08	31.78
20.2	45.89	31.72
21.2	45.70	31.66
22.2	45.52	31.57
23.2	45.35	31.48
24.2	45.19	31.39
25.2	45.04	31.29
26.2	44.89	31.20
27.2	44.75	31.12
28.2	44.59	31.04
29.2	44.44	30.96
30.2	44.27	30.88
31.2	44.11	30.81
32.2	43.93	30.71
	8.31	−8.25
	21h 38m 38s.548	
	−83° 5′ 34″.33	

ν Octantis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Nov.	22 16	−86 22
	s	″
1.3	49.95	46.41
2.3	49.64	46.54
3.3	49.32	46.68
4.3	48.99	46.81
5.3	48.62	46.91
6.3	48.25	47.00
7.3	47.88	47.06
8.3	47.54	47.09
9.3	47.20	47.10
10.3	46.87	47.12
11.3	46.59	47.14
12.3	46.30	47.17
13.3	46.02	47.22
14.3	45.71	47.28
15.3	45.38	47.34
16.3	45.03	47.40
17.3	44.67	47.46
18.3	44.29	47.48
19.3	43.91	47.49
20.3	43.53	47.49
21.3	43.15	47.46
22.3	42.79	47.43
23.3	42.45	47.40
24.3	42.12	47.36
25.3	41.80	47.31
26.2	41.49	47.26
27.2	41.18	47.21
28.2	40.88	47.18
29.2	40.57	47.15
30.2	40.24	47.12
31.2	39.89	47.09
32.2	39.53	47.04
	15.84	−15.80
	22h 16m 33s.212	
	−86° 22′ 50″.92	

β Octantis. Mag. 4.3		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Nov.	22 37	−81 48
	s	″
1.3	60.68	18.50
2.3	60.56	18.67
3.3	60.43	18.84
4.3	60.28	19.01
5.3	60.14	19.15
6.3	59.98	19.28
7.3	59.82	19.38
8.3	59.67	19.46
9.3	59.54	19.51
10.3	59.41	19.57
11.3	59.29	19.62
12.3	59.17	19.69
13.3	59.04	19.78
14.3	58.92	19.87
15.3	58.79	19.97
16.3	58.63	20.07
17.3	58.48	20.16
18.3	58.30	20.23
19.3	58.14	20.28
20.3	57.97	20.32
21.3	57.82	20.33
22.3	57.67	20.34
23.3	57.52	20.34
24.3	57.38	20.33
25.3	57.24	20.32
26.3	57.11	20.31
27.3	56.98	20.31
28.3	56.85	20.31
29.3	56.71	20.32
30.3	56.57	20.33
31.2	56.41	20.33
32.2	56.26	20.32
	7.02	−6.94
	22h 37m 51s.624	
	−81° 48′ 24″.80	

39 H. Cephei. Mag. 5.6		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Nov.	23 27	+86 52
	s	″
1.4	64.87	16.11
2.4	64.57	16.38
3.4	64.28	16.64
4.4	64.01	16.88
5.4	63.74	17.14
6.4	63.51	17.41
7.3	63.27	17.70
8.3	63.01	17.99
9.3	62.75	18.30
10.3	62.46	18.60
11.3	62.14	18.89
12.3	61.79	19.17
13.3	61.43	19.41
14.3	61.06	19.64
15.3	60.70	19.84
16.3	60.37	20.03
17.3	60.04	20.22
18.3	59.73	20.42
19.3	59.43	20.62
20.3	59.13	20.82
21.3	58.82	21.03
22.3	58.50	21.24
23.3	58.17	21.45
24.3	57.82	21.66
25.3	57.46	21.86
26.3	57.08	22.05
27.3	56.67	22.23
28.3	56.27	22.39
29.3	55.87	22.53
30.3	55.48	22.67
31.3	55.10	22.79
32.3	54.74	22.90
	18.33	+18.30
	23h 27m 43s.571	
	+86° 51′ 38″.62	

γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Nov.	23 47	−82 27
	s	″
1.4	32.16	58.83
2.4	32.05	59.08
3.4	31.93	59.34
4.4	31.80	59.59
5.4	31.67	59.83
6.4	31.52	60.06
7.4	31.38	60.25
8.4	31.24	60.42
9.4	31.10	60.57
10.4	30.96	60.72
11.4	30.84	60.85
12.3	30.73	60.99
13.3	30.63	61.16
14.3	30.50	61.34
15.3	30.36	61.53
16.3	30.22	61.71
17.3	30.07	61.90
18.3	29.90	62.08
19.3	29.73	62.26
20.3	29.57	62.39
21.3	29.40	62.52
22.3	29.25	62.62
23.3	29.10	62.72
24.3	28.94	62.81
25.3	28.80	62.90
26.3	28.65	62.98
27.3	28.52	63.06
28.3	28.38	63.14
29.3	28.24	63.24
30.3	28.09	63.34
31.3	27.92	63.44
32.3	27.75	63.54
	7.63	−7.56
	23h 47m 23s.637	
	−82° 28′ 8″.42	

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

43 H. Cephei. Mag. 4.5			α Ursæ Minoris. (*Polaris.*) Mag. 2.1			4 G. Octantis. Mag. 5.6			Groombridge 750. Mag. 6.7			Groombridge 944. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Dec.	0 57	+85 50	Dec.	1 32	+88 52	Dec.	1 41	−85 10	Dec.	4 11	+85 20	Dec.	5 36	+85 9
	s	″		s	″		s	″		s	″		s	″
0.3	49.34	2.28	0.4	52.05	54.74	0.4	57.92	40.14	0.5	17.22	37.29	0.5	28.35	26.50
1.3	49.13	2.51	1.4	51.36	55.00	1.4	57.73	40.39	1.5	17.24	37.61	1.5	28.46	26.80
2.3	48.93	2.73	2.4	50.72	55.26	2.4	57.52	40.63	2.5	17.27	37.92	2.5	28.57	27.08
3.3	48.74	2.94	3.4	50.13	55.54	3.4	57.29	40.86	3.5	17.30	38.22	3.5	28.69	27.35
4.3	48.56	3.16	4.4	49.57	55.77	4.4	57.06	41.07	4.5	17.34	38.51	4.5	28.82	27.61
5.3	48.39	3.40	5.4	49.02	56.04	5.4	56.81	41.27	5.5	17.39	38.83	5.5	28.96	27.87
6.3	48.21	3.66	6.4	48.47	56.33	6.4	56.56	41.43	6.5	17.46	39.15	6.5	29.11	28.15
7.3	48.02	3.93	7.4	47.87	56.65	7.4	56.32	41.58	7.5	17.53	39.49	7.5	29.26	28.43
8.3	47.81	4.18	8.4	47.18	56.96	8.4	56.09	41.71	8.5	17.58	39.85	8.5	29.41	28.76
9.3	47.57	4.43	9.3	46.41	57.27	9.4	55.89	41.84	9.5	17.59	40.22	9.5	29.56	29.10
10.3	47.31	4.68	10.3	45.55	57.56	10.4	55.67	41.98	10.5	17.60	40.58	10.5	29.67	29.45
11.3	47.04	4.90	11.3	44.66	57.82	11.4	55.48	42.13	11.5	17.58	40.95	11.5	29.77	29.80
12.3	46.77	5.09	12.3	43.73	58.06	12.3	55.27	42.31	12.5	17.54	41.28	12.5	29.83	30.15
13.3	46.50	5.26	13.3	42.82	58.27	13.3	55.05	42.48	13.4	17.49	41.62	13.5	29.89	30.48
14.3	46.25	5.41	14.3	41.95	58.46	14.3	54.82	42.65	14.4	17.44	41.92	14.5	29.94	30.77
15.3	46.01	5.56	15.3	41.11	58.66	15.3	54.58	42.82	15.4	17.40	42.22	15.5	29.99	31.07
16.3	45.77	5.70	16.3	40.32	58.86	16.3	54.31	42.99	16.4	17.35	42.50	16.5	30.03	31.36
17.3	45.54	5.85	17.3	39.54	59.05	17.3	54.05	43.14	17.4	17.32	42.79	17.5	30.08	31.64
18.3	45.31	6.01	18.3	38.76	59.25	18.3	53.78	43.28	18.4	17.29	43.07	18.5	30.14	31.93
19.3	45.09	6.17	19.3	37.98	59.46	19.3	53.51	43.39	19.4	17.27	43.39	19.5	30.21	32.23
20.3	44.85	6.33	20.3	37.16	59.66	20.3	53.24	43.50	20.4	17.24	43.70	20.5	30.28	32.54
21.3	44.61	6.49	21.3	36.31	59.89	21.3	52.98	43.59	21.4	17.21	44.01	21.5	30.35	32.85
22.3	44.34	6.65	22.3	35.42	60.10	22.3	52.73	43.66	22.4	17.16	44.33	22.5	30.41	33.17
23.3	44.07	6.81	23.3	34.47	60.31	23.3	52.48	43.72	23.4	17.11	44.65	23.5	30.46	33.50
24.3	43.79	6.96	24.3	33.45	60.51	24.3	52.23	43.78	24.4	17.05	45.00	24.5	30.50	33.85
25.3	43.49	7.10	25.3	32.40	60.69	25.3	51.99	43.85	25.4	16.96	45.33	25.5	30.52	34.20
26.3	43.19	7.21	26.3	31.33	60.87	26.3	51.76	43.93	26.4	16.86	45.66	26.5	30.53	34.55
27.3	42.89	7.31	27.3	30.24	61.01	27.3	51.52	44.01	27.4	16.75	45.95	27.5	30.52	34.90
28.3	42.60	7.40	28.3	29.18	61.15	28.3	51.26	44.09	28.4	16.62	46.24	28.5	30.48	35.23
29.3	42.31	7.46	29.3	28.16	61.28	29.3	51.00	44.17	29.4	16.50	46.51	29.5	30.47	35.52
30.3	42.04	7.51	30.3	27.20	61.38	30.3	50.72	44.25	30.4	16.39	46.76	30.5	30.45	35.81
31.3	41.79	7.56	31.3	26.29	61.49	31.3	50.43	44.31	31.4	16.29	47.01	31.5	30.43	36.10
13.77	+13.73		51.30	+51.29		11.90	−11.86		12.32	+12.28		11.85	+11.81	
0^h	57^m	$24^s.633$	1^h	31^m	$11^s.709$	1^h	41^m	$54^s.846$	4^h	10^m	$37^s.831$	5^h	35^m	$50^s.330$
+85°	49′	24″.14	+88°	52′	20″.55	−85°	10′	45″.22	+85°	20′	28″.88	+85°	9′	34″.51

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

31 G. Mensae. Mag. 6.2			ζ Mensae. Mag. 5.6			51 H. Cephei. Mag. 5.3			25 H. Camelop. Mag. 5.1			7 G. Octantis. Mag. 6.4		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Dec.	5 45	−84 49	Dec.	6 46	−80 43	Dec.	7 3	+87 10	Dec.	7 14	+82 33	Dec.	7 15	−86 54
	s	″		s	″		s	″		s	″		s	″
0.5	51.75	42.35	0.6	50.43	45.38	0.6	56.51	20.10	0.6	30.15	52.13	0.6	37.46	19.84
1.5	51.82	42.67	1.6	50.49	45.69	1.6	56.83	20.34	1.6	30.28	52.34	1.6	37.71	20.12
2.5	51.87	43.03	2.6	50.56	46.02	2.6	57.15	20.54	2.6	30.41	52.54	2.6	37.97	20.43
3.5	51.92	43.42	3.6	50.63	46.38	3.6	57.47	20.75	3.6	30.54	52.72	3.6	38.22	20.75
4.5	51.96	43.81	4.6	50.69	46.76	4.6	57.81	20.95	4.6	30.68	52.87	4.6	38.43	21.10
5.5	51.97	44.19	5.6	50.74	47.14	5.6	58.18	21.13	5.6	30.82	53.04	5.6	38.61	21.46
6.5	51.97	44.57	6.6	50.80	47.51	6.6	58.56	21.32	6.6	30.99	53.21	6.6	38.77	21.82
7.5	51.96	44.92	7.6	50.84	47.87	7.6	58.97	21.55	7.6	31.16	53.39	7.6	38.91	22.15
8.5	51.94	45.26	8.6	50.87	48.23	8.6	59.36	21.78	8.6	31.33	53.61	8.6	39.03	22.49
9.5	51.93	45.58	9.6	50.90	48.55	9.6	59.75	22.05	9.6	31.49	53.84	9.6	39.15	22.79
10.5	51.92	45.89	10.6	50.94	48.86	10.6	60.09	22.34	10.6	31.64	54.11	10.6	39.28	23.08
11.5	51.92	46.20	11.6	50.98	49.17	11.6	60.42	22.63	11.6	31.77	54.39	11.6	39.41	23.37
12.5	51.92	46.51	12.6	51.02	49.50	12.6	60.69	22.92	12.6	31.89	54.65	12.6	39.56	23.66
13.5	51.93	46.85	13.6	51.06	49.82	13.6	60.94	23.20	13.6	31.99	54.90	13.6	39.73	23.97
14.5	51.93	47.21	14.6	51.10	50.18	14.6	61.18	23.48	14.6	32.09	55.14	14.6	39.90	24.30
15.5	51.93	47.57	15.5	51.14	50.55	15.6	61.41	23.72	15.6	32.18	55.38	15.6	40.05	24.65
16.5	51.92	47.96	16.5	51.18	50.93	16.6	61.63	23.97	16.6	32.28	55.61	16.6	40.19	25.01
17.5	51.89	48.34	17.5	51.21	51.32	17.6	61.87	24.21	17.6	32.38	55.84	17.6	40.33	25.37
18.5	51.85	48.72	18.5	51.24	51.71	18.6	62.11	24.45	18.6	32.48	56.07	18.6	40.43	25.74
19.5	51.81	49.10	19.5	51.25	52.10	19.5	62.36	24.70	19.6	32.59	56.28	19.6	40.53	26.12
20.5	51.76	49.47	20.5	51.26	52.48	20.5	62.63	24.97	20.6	32.71	56.52	20.6	40.59	26.50
21.5	51.69	49.81	21.5	51.28	52.85	21.5	62.89	25.25	21.6	32.82	56.78	21.6	40.65	26.87
22.5	51.62	50.16	22.5	51.28	53.22	22.5	63.15	25.54	22.5	32.94	57.04	22.6	40.70	27.20
23.5	51.55	50.48	23.5	51.29	53.57	23.5	63.40	25.85	23.5	33.05	57.32	23.5	40.73	27.53
24.5	51.48	50.79	24.5	51.29	53.91	24.5	63.64	26.17	24.5	33.15	57.63	24.5	40.76	27.86
25.5	51.41	51.11	25.5	51.29	54.24	25.5	63.84	26.49	25.5	33.25	57.94	25.5	40.79	28.19
26.5	51.35	51.43	26.5	51.29	54.58	26.5	64.03	26.82	26.5	33.34	58.24	26.5	40.82	28.52
27.5	51.29	51.74	27.5	51.29	54.92	27.5	64.17	27.15	27.5	33.40	58.56	27.5	40.86	28.85
28.5	51.23	52.07	28.5	51.30	55.27	28.5	64.31	27.47	28.5	33.46	58.84	28.5	40.91	29.19
29.5	51.15	52.43	29.5	51.30	55.63	29.5	64.42	27.77	29.5	33.51	59.12	29.5	40.96	29.55
30.5	51.07	52.79	30.5	51.30	56.00	30.5	64.53	28.06	30.5	33.57	59.39	30.5	41.00	29.92
31.5	50.98	53.15	31.5	51.29	56.41	31.5	64.66	28.33	31.5	33.63	59.64	31.5	41.02	30.33
11.10		−11.05	6.21		−6.13	20.28		+20.25	7.73		+7.66	18.53		−18.51
5^h	45^m	$51^s.396$	6^h	46^m	$48^s.653$	7^h	3^m	$2^s.335$	7^h	14^m	$7^s.912$	7^h	15^m	$39^s.691$
−84°	49′	44″.27	−80°	43′	46″.14	+87°	10′	43″.86	+82°	34′	17″.32	−86°	54′	19″.75

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

Groombridge 1119. Mag. 7.0			ζ Octantis. Mag. 5.4			1 H. Draconis. Mag. 4.6			ζ Chamæleontis. Mag. 5.2			30 H. Camelop. Mag. 5.3		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Dec.	8 19	+88 52	Dec.	9 8	−85 20	Dec.	9 25	+81 40	Dec.	9 36	−80 34	Dec.	10 21	+82 57
	s	″		s	″		s	″		s	″		s	″
0.7	25.19	3.21	0.7	41.83	29.02	0.7	50.47	29.54	0.7	21.18	41.94	0.7	26.88	34.23
1.7	26.20	3.35	1.7	42.09	29.19	1.7	50.63	29.57	1.7	21.31	42.08	1.7	27.07	34.18
2.6	27.18	3.48	2.7	42.36	29.37	2.7	50.78	29.58	2.7	21.45	42.25	2.7	27.25	34.13
3.6	28.15	3.59	3.7	42.63	29.59	3.7	50.93	29.59	3.7	21.60	42.42	3.7	27.42	34.08
4.6	29.16	3.70	4.7	42.87	29.82	4.7	51.09	29.58	4.7	21.74	42.61	4.7	27.60	33.99
5.6	30.21	3.81	5.7	43.13	30.07	5.7	51.26	29.58	5.7	21.88	42.84	5.7	27.79	33.90
6.6	31.33	3.90	6.7	43.36	30.34	6.7	51.43	29.58	6.7	22.02	43.08	6.7	27.99	33.81
7.6	32.50	4.03	7.7	43.57	30.59	7.7	51.62	29.58	7.7	22.15	43.33	7.7	28.19	33.73
8.6	33.69	4.17	8.7	43.76	30.84	8.7	51.80	29.60	8.7	22.26	43.56	8.7	28.42	33.67
9.6	34.88	4.34	9.7	43.96	31.08	9.7	51.99	29.64	9.7	22.37	43.77	9.7	28.64	33.62
10.6	36.01	4.51	10.7	44.15	31.30	10.7	52.17	29.72	10.7	22.48	43.97	10.7	28.87	33.60
11.6	37.07	4.71	11.7	44.35	31.50	11.7	52.34	29.81	11.7	22.59	44.16	11.7	29.08	33.61
12.6	38.05	4.94	12.7	44.55	31.70	12.7	52.52	29.91	12.7	22.70	44.35	12.7	29.27	33.65
13.6	38.95	5.16	13.7	44.77	31.92	13.7	52.66	30.01	13.7	22.83	44.55	13.7	29.47	33.69
14.6	39.79	5.36	14.7	44.99	32.16	14.7	52.80	30.11	14.7	22.95	44.78	14.7	29.65	33.72
15.6	40.59	5.56	15.6	45.22	32.40	15.7	52.94	30.22	15.7	23.08	45.01	15.7	29.82	33.75
16.6	41.39	5.75	16.6	45.45	32.67	16.7	53.08	30.33	16.7	23.21	45.24	16.7	29.99	33.76
17.6	42.22	5.94	17.6	45.67	32.95	17.7	53.22	30.42	17.7	23.34	45.50	17.7	30.16	33.78
18.6	43.06	6.12	18.6	45.87	33.27	18.7	53.36	30.50	18.7	23.46	45.78	18.7	30.34	33.80
19.6	43.93	6.31	19.6	46.07	33.57	19.6	53.50	30.59	19.7	23.58	46.06	19.7	30.52	33.82
20.6	44.82	6.50	20.6	46.25	33.88	20.6	53.65	30.67	20.7	23.69	46.35	20.7	30.70	33.83
21.6	45.74	6.69	21.6	46.43	34.19	21.6	53.81	30.77	21.7	23.80	46.64	21.7	30.90	33.86
22.6	46.66	6.91	22.6	46.59	34.49	22.6	53.98	30.89	22.6	23.90	46.94	22.7	31.10	33.89
23.6	47.56	7.14	23.6	46.74	34.78	23.6	54.14	31.02	23.6	23.99	47.22	23.7	31.31	33.93
24.6	48.46	7.41	24.6	46.88	35.07	24.6	54.29	31.16	24.6	24.08	47.49	24.7	31.51	33.99
25.6	49.31	7.67	25.6	47.03	35.35	25.6	54.45	31.31	25.6	24.17	47.77	25.7	31.71	34.08
26.6	50.09	7.94	26.6	47.18	35.64	26.6	54.60	31.49	26.6	24.26	48.04	26.7	31.90	34.19
27.6	50.80	8.21	27.6	47.33	35.92	27.6	54.74	31.68	27.6	24.36	48.30	27.7	32.09	34.30
28.6	51.45	8.49	28.6	47.50	36.20	28.6	54.87	31.86	28.6	24.46	48.57	28.7	32.26	34.43
29.6	52.05	8.75	29.6	47.67	36.49	29.6	54.97	32.04	29.6	24.55	48.86	29.7	32.41	34.56
30.6	52.61	8.99	30.6	47.84	36.81	30.6	55.09	32.21	30.6	24.65	49.17	30.7	32.57	34.67
31.6	53.19	9.22	31.6	47.99	37.17	31.6	55.20	32.36	31.6	24.76	49.49	31.7	32.72	34.76
50.63		+50.62	12.31		−12.27	6.91		+6.83	6.11		−6.03	8.16		+8.10
8^h	17^m	$47^s.546$	9^h	8^m	$41^s.594$	9^h	25^m	$39^s.275$	9^h	36^m	$19^s.026$	10^h	21^m	$19^s.949$
+88°	52′	37″.80	−85°	20′	26″.78	+81°	41′	10″.13	−80°	34′	39″.26	+82°	58′	17″.67

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

η Octantis. Mag. 6.3

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Dec.	10 59	−84 9
	s	″
0.8	56.55	33.21
1.8	56.78	33.21
2.8	57.02	33.23
3.8	57.27	33.27
4.8	57.53	33.34
5.8	57.78	33.43
6.7	58.01	33.54
7.7	58.25	33.67
8.7	58.48	33.78
9.7	58.68	33.89
10.7	58.88	33.99
11.7	59.08	34.08
12.7	59.29	34.16
13.7	59.51	34.25
14.7	59.74	34.34
15.7	59.97	34.43
16.7	60.21	34.55
17.7	60.45	34.69
18.7	60.69	34.84
19.7	60.92	35.01
20.7	61.15	35.20
21.7	61.38	35.38
22.7	61.57	35.56
23.7	61.77	35.75
24.7	61.96	35.94
25.7	62.15	36.12
26.7	62.34	36.29
27.7	62.54	36.47
28.7	62.73	36.63
29.7	62.95	36.81
30.7	63.17	37.01
31.7	63.39	37.24

9.83 −9.78
10h 59m 54s.546
−84° 9′ 29″.33

Bradley 1672. Mag. 6.3

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Dec.	12 14	+88 8
	s	″
0.8	1.29	14.62
1.8	1.85	14.43
2.8	2.39	14.26
3.8	2.91	14.06
4.8	3.41	13.85
5.8	3.93	13.65
6.8	4.49	13.42
7.8	5.08	13.19
8.8	5.75	12.97
9.8	6.44	12.77
10.8	7.15	12.59
11.8	7.86	12.44
12.8	8.55	12.31
13.8	9.21	12.20
14.8	9.83	12.10
15.8	10.45	11.99
16.8	11.04	11.88
17.8	11.62	11.75
18.8	12.22	11.62
19.8	12.83	11.49
20.8	13.47	11.36
21.8	14.13	11.25
22.8	14.83	11.14
23.8	15.54	11.04
24.8	16.28	10.95
25.7	17.02	10.88
26.7	17.76	10.82
27.7	18.48	10.79
28.7	19.18	10.76
29.7	19.83	10.73
30.7	20.44	10.70
31.7	21.04	10.67

30.75 +30.74
12h 14m 29s.190
+88° 8′ 56″.19

ι Octantis. Mag. 5.4

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Dec.	12 46	−84 41
	s	″
0.8	22.53	6.05
1.8	22.75	5.90
2.8	22.99	5.76
3.8	23.26	5.63
4.8	23.52	5.53
5.8	23.80	5.44
6.8	24.08	5.39
7.8	24.33	5.35
8.8	24.58	5.32
9.8	24.81	5.29
10.8	25.04	5.27
11.8	25.26	5.23
12.8	25.49	5.17
13.8	25.72	5.08
14.8	25.96	5.00
15.8	26.23	4.93
16.8	26.50	4.87
17.8	26.77	4.85
18.8	27.06	4.84
19.8	27.34	4.84
20.8	27.61	4.86
21.8	27.88	4.89
22.8	28.13	4.92
23.8	28.38	4.96
24.8	28.63	5.00
25.8	28.86	5.03
26.8	29.10	5.06
27.8	29.34	5.07
28.8	29.59	5.10
29.8	29.85	5.13
30.8	30.12	5.16
31.8	30.42	5.21

10.79 −10.75
12h 46m 19s.119
−84° 41′ 1″.57

32 H. Camelop. seq. Mag. 5.3

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Dec.	12 48	+83 50
	s	″
0.8	21.69	32.76
1.8	21.84	32.52
2.8	21.99	32.30
3.8	22.14	32.07
4.8	22.28	31.83
5.8	22.43	31.56
6.8	22.59	31.29
7.8	22.76	31.01
8.8	22.95	30.74
9.8	23.14	30.47
10.8	23.34	30.23
11.8	23.54	30.02
12.8	23.75	29.82
13.8	23.94	29.64
14.8	24.13	29.49
15.8	24.31	29.33
16.8	24.48	29.16
17.8	24.65	28.99
18.8	24.82	28.82
19.8	25.01	28.64
20.8	25.19	28.47
21.8	25.39	28.30
22.8	25.59	28.12
23.8	25.81	27.96
24.8	26.04	27.81
25.8	26.26	27.67
26.8	26.48	27.55
27.8	26.70	27.45
28.8	26.90	27.36
29.8	27.10	27.28
30.8	27.29	27.22
31.8	27.48	27.14

9.32 +9.27
12h 48m 31s.308
+83° 51′ 11″.30

κ Octantis. Mag. 5.6

Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′
Dec.	13 27	−85 22
	s	″
0.9	36.87	23.99
1.9	37.10	23.79
2.9	37.34	23.59
3.9	37.61	23.40
4.9	37.90	23.24
5.9	38.19	23.10
6.9	38.48	22.98
7.8	38.77	22.87
8.8	39.04	22.78
9.8	39.29	22.69
10.8	39.54	22.60
11.8	39.78	22.50
12.8	40.02	22.36
13.8	40.27	22.24
14.8	40.54	22.11
15.8	40.82	21.98
16.8	41.12	21.87
17.8	41.43	21.77
18.8	41.74	21.69
19.8	42.05	21.63
20.8	42.36	21.58
21.8	42.65	21.54
22.8	42.95	21.53
23.8	43.24	21.50
24.8	43.51	21.47
25.8	43.79	21.44
26.8	44.05	21.41
27.8	44.32	21.38
28.8	44.60	21.35
29.8	44.90	21.31
30.8	45.22	21.28
31.8	45.54	21.27

12.40 −12.35
13h 27m 32s.891
−85° 22′ 19″.48

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Octantis. Mag. 4.1			Groombridge 2283. Mag. 7.2			ρ Octantis. Mag. 5.7			ε Ursæ Minoris. Mag. 4.4			59 G. Apodis. Mag. 5.9		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Dec.	14 13	−83 17	Dec.	15 2	+87 32	Dec.	15 24	−84 11	Dec.	16 53	+82 10	Dec.	17 16	−80 47
	s	″		s	″		s	″		s	″		s	″
0.9	50.71	58.73	0.9	5.07	22.06	0.9	28.81	58.87	1.0	54.97	21.82	1.0	22.48	15.79
1.9	50.83	58.48	1.9	5.20	21.73	1.9	28.90	58.56	2.0	54.94	21.48	2.0	22.47	15.46
2.9	50.97	58.23	2.9	5.31	21.42	2.9	29.00	58.24	3.0	54.91	21.17	3.0	22.47	15.13
3.9	51.14	57.99	3.9	5.41	21.11	3.9	29.14	57.92	4.0	54.87	20.86	4.0	22.47	14.76
4.9	51.32	57.77	4.9	5.49	20.80	4.9	29.28	57.64	5.0	54.83	20.55	5.0	22.51	14.41
5.9	51.51	57.57	5.9	5.58	20.47	5.9	29.44	57.35	5.9	54.79	20.22	6.0	22.55	14.08
6.9	51.70	57.39	6.9	5.66	20.10	6.9	29.61	57.10	6.9	54.75	19.89	7.0	22.59	13.76
7.9	51.89	57.25	7.9	5.78	19.74	7.9	29.78	56.85	7.9	54.71	19.52	8.0	22.65	13.47
8.9	52.06	57.11	8.9	5.92	19.37	8.9	29.94	56.64	8.9	54.68	19.15	9.0	22.70	13.18
9.9	52.23	56.97	9.9	6.11	18.99	9.9	30.09	56.42	9.9	54.65	18.76	10.0	22.75	12.91
10.9	52.38	56.82	10.9	6.34	18.62	10.9	30.23	56.20	10.9	54.64	18.35	10.9	22.78	12.65
11.9	52.53	56.65	11.9	6.58	18.29	11.9	30.36	55.98	11.9	54.64	17.95	11.9	22.81	12.38
12.9	52.68	56.48	12.9	6.85	17.97	12.9	30.48	55.74	12.9	54.64	17.57	12.9	22.84	12.09
13.9	52.84	56.30	13.9	7.10	17.67	13.9	30.61	55.46	13.9	54.66	17.23	13.9	22.86	11.78
14.9	53.01	56.11	14.9	7.35	17.38	14.9	30.75	55.19	14.9	54.67	16.89	14.9	22.89	11.46
15.9	53.18	55.93	15.9	7.58	17.11	15.9	30.92	54.92	15.9	54.68	16.55	15.9	22.92	11.14
16.9	53.36	55.75	16.9	7.82	16.83	16.9	31.09	54.66	16.9	54.68	16.25	16.9	22.96	10.80
17.9	53.56	55.59	17.9	8.04	16.56	17.9	31.27	54.41	17.9	54.69	15.94	17.9	23.01	10.47
18.9	53.77	55.45	18.9	8.27	16.29	18.9	31.45	54.16	18.9	54.69	15.62	18.9	23.06	10.14
19.8	53.98	55.31	19.9	8.49	15.97	19.9	31.64	53.93	19.9	54.71	15.28	19.9	23.13	9.81
20.8	54.18	55.19	20.9	8.73	15.67	20.9	31.84	53.73	20.9	54.72	14.93	20.9	23.21	9.51
21.8	54.38	55.09	21.9	8.99	15.36	21.9	32.05	53.53	21.9	54.73	14.57	21.9	23.30	9.23
22.8	54.58	55.01	22.9	9.27	15.05	22.9	32.25	53.36	22.9	54.74	14.21	22.9	23.38	8.94
23.8	54.78	54.94	23.9	9.58	14.76	23.9	32.44	53.18	23.9	54.78	13.83	23.9	23.44	8.68
24.8	54.97	54.86	24.9	9.90	14.46	24.9	32.63	53.02	24.9	54.81	13.46	24.9	23.51	8.43
25.8	55.15	54.77	25.9	10.26	14.16	25.9	32.81	52.85	25.9	54.85	13.08	25.9	23.57	8.18
26.8	55.33	54.69	26.9	10.63	13.88	26.9	32.99	52.67	26.9	54.90	12.71	26.9	23.64	7.93
27.8	55.51	54.60	27.9	11.01	13.60	27.9	33.16	52.49	27.9	54.95	12.37	27.9	23.70	7.66
28.8	55.69	54.49	28.9	11.38	13.37	28.9	33.33	52.29	28.9	55.00	12.04	28.9	23.76	7.38
29.8	55.89	54.39	29.9	11.73	13.15	29.9	33.53	52.10	29.9	55.05	11.72	29.9	23.85	7.07
30.8	56.11	54.30	30.9	12.07	12.92	30.9	33.73	51.90	30.9	55.10	11.43	30.9	23.92	6.75
31.8	56.33	54.21	31.8	12.39	12.71	31.9	33.96	51.70	31.9	55.15	11.14	31.9	24.01	6.44
	8.57	−8.51		23.28	+23.26		9.89	−9.84		7.34	+7.27		6.25	−6.17
14^h	13^m	$46^s.350$	15^h	3^m	$2^s.510$	15^h	24^m	$23^s.351$	16^h	54^m	$12^s.991$	17^h	16^m	$17^s.234$
−83°	17′	54″.52	+87°	32′	42″.66	−84°	11′	55″.43	+82°	10′	21″.42	−80°	47′	14″.27

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

δ Ursae Minoris. Mag. 4.4			χ Octantis. Mag. 5.2			λ Ursae Minoris. Mag. 6.6			σ Octantis. Mag. 5.5			76 Draconis. Mag. 5.7		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Dec.	17 57	+86 36	Dec.	18 7	−87 39	Dec.	18 57	+89 1	Dec.	19 31	−89 13	Dec.	20 48	+82 14
	s	″		s	″		s	″		s	″		s	″
1.1	37.73	63.48	1.1	34.29	51.89	1.1	49.90	35.90	1.1	17.00	12.61	1.2	24.39	34.99
2.1	37.55	63.19	2.1	34.11	51.57	2.1	49.02	35.66	2.1	15.92	12.33	2.2	24.24	34.88
3.1	37.38	62.91	3.1	33.97	51.22	3.1	48.14	35.45	3.1	14.88	12.02	3.2	24.10	34.79
4.0	37.20	62.65	4.1	33.86	50.85	4.1	47.26	35.25	4.1	13.92	11.70	4.2	23.96	34.71
5.0	37.00	62.38	5.1	33.78	50.47	5.1	46.30	35.05	5.1	13.07	11.37	5.2	23.82	34.62
6.0	36.80	62.11	6.0	33.77	50.10	6.1	45.29	34.83	6.1	12.34	11.05	6.2	23.67	34.53
7.0	36.57	61.83	7.0	33.80	49.77	7.1	44.23	34.61	7.1	11.75	10.73	7.2	23.52	34.44
8.0	36.36	61.50	8.0	33.83	49.44	8.1	43.16	34.37	8.1	11.23	10.41	8.2	23.36	34.34
9.0	36.16	61.16	9.0	33.86	49.12	9.1	42.11	34.08	9.1	10.76	10.11	9.2	23.20	34.21
10.0	35.98	60.79	10.0	33.88	48.84	10.1	41.12	33.80	10.1	10.26	9.82	10.1	23.03	34.04
11.0	35.83	60.43	11.0	33.88	48.56	11.1	40.22	33.50	11.1	9.72	9.55	11.1	22.86	33.86
12.0	35.70	60.08	12.0	33.84	48.25	12.1	39.42	33.18	12.1	9.08	9.28	12.1	22.71	33.67
13.0	35.60	59.74	13.0	33.81	47.93	13.1	38.71	32.87	13.1	8.38	9.01	13.1	22.57	33.47
14.0	35.50	59.42	14.0	33.76	47.60	14.1	38.06	32.58	14.1	7.64	8.70	14.1	22.44	33.27
15.0	35.42	59.10	15.0	33.71	47.24	15.1	37.46	32.30	15.1	6.92	8.38	15.1	22.32	33.07
16.0	35.34	58.81	16.0	33.69	46.88	16.1	36.87	32.02	16.1	6.23	8.05	16.1	22.19	32.91
17.0	35.25	58.51	17.0	33.71	46.51	17.1	36.26	31.78	17.1	5.60	7.69	17.1	22.07	32.74
18.0	35.15	58.21	18.0	33.76	46.14	18.1	35.62	31.53	18.1	5.06	7.32	18.1	21.94	32.57
19.0	35.06	57.91	19.0	33.84	45.77	19.0	34.97	31.26	19.1	4.61	6.95	19.1	21.83	32.39
20.0	34.97	57.60	20.0	33.93	45.41	20.0	34.30	31.00	20.1	4.25	6.59	20.1	21.71	32.22
21.0	34.87	57.27	21.0	34.06	45.07	21.0	33.63	30.71	21.1	3.96	6.24	21.1	21.58	32.04
21.9	34.78	56.94	22.0	34.20	44.72	22.0	32.96	30.40	22.1	3.75	5.90	22.1	21.45	31.84
22.9	34.70	56.60	23.0	34.35	44.39	23.0	32.31	30.09	23.1	3.56	5.56	23.1	21.31	31.61
23.9	34.63	56.24	23.9	34.49	44.10	24.0	31.69	29.76	24.1	3.40	5.24	24.1	21.18	31.38
24.9	34.57	55.87	24.9	34.64	43.80	25.0	31.11	29.42	25.1	3.23	4.93	25.1	21.05	31.14
25.9	34.54	55.50	25.9	34.77	43.51	26.0	30.61	29.08	26.1	3.07	4.62	26.1	20.94	30.87
26.9	34.52	55.13	26.9	34.88	43.20	27.0	30.20	28.75	27.0	2.84	4.30	27.1	20.83	30.61
27.9	34.52	54.78	27.9	34.99	42.89	28.0	29.85	28.43	28.0	2.56	3.99	28.1	20.72	30.35
28.9	34.54	54.44	28.9	35.10	42.55	29.0	29.56	28.11	29.0	2.27	3.65	29.1	20.61	30.10
29.9	34.56	54.11	29.9	35.23	42.21	30.0	29.28	27.79	30.0	2.00	3.28	30.1	20.52	29.85
30.9	34.57	53.80	30.9	35.39	41.85	31.0	29.04	27.51	31.0	1.79	2.91	31.1	20.43	29.61
31.9	34.58	53.51	31.9	35.57	41.48	32.0	28.75	27.25	32.0	1.66	2.53	32.1	20.34	29.38
16.94		+16.91	24.52		−24.50	58.81		+58.80	73.36		−73.36	7.41		+7.34
17^h	58^m	$22^s.311$	18^h	7^m	$23^s.343$	19^h	0^m	$15^s.079$	19^h	30^m	$50^s.769$	20^h	48^m	$32^s.146$
+86°	36′	51″.04	−87°	39′	50″.89	+89°	1′	12″.80	−89°	13′	13″.35	+82°	13′	56″.82

CIRCUMPOLAR STARS.

FOR THE UPPER TRANSIT AT WASHINGTON.

λ Octantis. Mag. 5.4			υ Octantis. Mag. 5.7			β Octantis. Mag. 4.3			39 H. Cephei. Mag. 5.6			γ^1 Octantis. Mag. 5.1		
Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.	Wash. Mean Time.	Right Ascension.	Declination.
	h m	° ′		h m	° ′		h m	° ′		h m	° ′		h m	° ′
Dec.	21 38	−83 5	Dec.	22 16	−86 22	Dec.	22 37	−81 48	Dec.	23 27	+86 52	Dec.	23 47	−82 28
	s	″		s	″		s	″		s	″		s	″
1.2	44.11	30.81	1.2	39.89	47.09	1.2	56.41	20.33	1.3	55.10	22.79	1.3	27.92	3.44
2.2	43.93	30.71	2.2	39.53	47.04	2.2	56.26	20.32	2.3	54.74	22.90	2.3	27.75	3.54
3.2	43.74	30.57	3.2	39.16	46.96	3.2	56.09	20.28	3.3	54.40	23.02	3.3	27.57	3.60
4.2	43.56	30.43	4.2	38.78	46.86	4.2	55.94	20.21	4.3	54.07	23.15	4.3	27.39	3.66
5.2	43.39	30.26	5.2	38.41	46.72	5.2	55.77	20.13	5.3	53.74	23.29	5.3	27.21	3.69
6.2	43.24	30.06	6.2	38.08	46.57	6.2	55.62	20.04	6.3	53.40	23.45	6.3	27.04	3.70
7.2	43.10	29.86	7.2	37.78	46.42	7.2	55.49	19.91	7.3	53.03	23.62	7.3	26.87	3.68
8.2	42.98	29.66	8.2	37.49	46.26	8.2	55.37	19.79	8.3	52.62	23.77	8.3	26.72	3.67
9.2	42.86	29.48	9.2	37.22	46.10	9.2	55.25	19.69	9.3	52.22	23.91	9.3	26.58	3.65
10.2	42.74	29.31	10.2	36.97	45.96	10.2	55.13	19.58	10.3	51.79	24.02	10.3	26.45	3.63
11.2	42.62	29.15	11.2	36.67	45.84	11.2	55.01	19.50	11.3	51.35	24.12	11.3	26.31	3.62
12.2	42.48	29.01	12.2	36.38	45.74	12.2	54.88	19.43	12.3	50.91	24.18	12.3	26.16	3.63
13.2	42.34	28.86	13.2	36.07	45.62	13.2	54.74	19.35	13.3	50.50	24.21	13.3	26.00	3.65
14.2	42.18	28.69	14.2	35.75	45.50	14.2	54.59	19.28	14.2	50.11	24.24	14.3	25.83	3.67
15.2	42.02	28.52	15.2	35.42	45.37	15.2	54.45	19.19	15.2	49.73	24.27	15.3	25.66	3.68
16.2	41.87	28.33	16.2	35.08	45.20	16.2	54.29	19.07	16.2	49.36	24.31	16.3	25.48	3.69
17.2	41.72	28.11	17.2	34.74	45.02	17.2	54.14	18.95	17.2	49.01	24.35	17.3	25.29	3.66
18.2	41.56	27.89	18.2	34.40	44.84	18.2	53.99	18.80	18.2	48.65	24.39	18.3	25.11	3.62
19.2	41.42	27.65	19.2	34.09	44.65	19.2	53.85	18.65	19.2	48.29	24.43	19.2	24.94	3.58
20.2	41.29	27.41	20.2	33.80	44.45	20.2	53.71	18.48	20.2	47.92	24.47	20.2	24.77	3.51
21.2	41.18	27.16	21.2	33.51	44.23	21.2	53.58	18.31	21.2	47.54	24.52	21.2	24.62	3.42
22.2	41.07	26.91	22.2	33.24	44.00	22.2	53.46	18.13	22.2	47.13	24.56	22.2	24.47	3.34
23.1	40.96	26.67	23.2	33.00	43.78	23.2	53.35	17.95	23.2	46.71	24.59	23.2	24.32	3.25
24.1	40.86	26.43	24.2	32.75	43.58	24.2	53.25	17.77	24.2	46.29	24.60	24.2	24.17	3.15
25.1	40.77	26.19	25.2	32.52	43.37	25.2	53.15	17.60	25.2	45.86	24.60	25.2	24.03	3.05
26.1	40.67	25.96	26.2	32.28	43.17	26.2	53.03	17.43	26.2	45.42	24.59	26.2	23.89	2.97
27.1	40.57	25.74	27.2	32.02	42.98	27.2	52.91	17.29	27.2	45.00	24.55	27.2	23.74	2.90
28.1	40.44	25.53	28.2	31.76	42.79	28.2	52.79	17.13	28.2	44.59	24.50	28.2	23.57	2.83
29.1	40.31	25.29	29.2	31.49	42.57	29.2	52.66	16.96	29.2	44.21	24.44	29.2	23.41	2.76
30.1	40.19	25.02	30.2	31.20	42.34	30.2	52.52	16.78	30.2	43.84	24.38	30.2	23.24	2.68
31.1	40.07	24.75	31.2	30.91	42.10	31.2	52.39	16.58	31.2	43.50	24.33	31.2	23.07	2.58
32.1	39.95	24.46	32.2	30.63	41.83	32.2	52.26	16.35	32.2	43.16	24.29	32.2	22.90	2.44
8.31		−8.25	15.83		−15.80	7.02		−6.94	18.33		+18.31	7.63		−7.56
21ʰ	38ᵐ	38ˢ.548	22ʰ	16ᵐ	33ˢ.212	22ʰ	37ᵐ	51ˢ.624	23ʰ	27ᵐ	43ˢ.571	23ʰ	47ᵐ	23ˢ.637
−83°	5′	34″.33	−86°	22′	50″.92	−81°	48′	24″.80	+86°	51′	38″.62	−82°	28′	8″.42

FOR THE UPPER TRANSIT AT .

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	12 Ceti. Mag. 6.0 Right Ascension.	Diff.	Declination.	Diff.	13 Ceti. Mag. 5.2 Right Ascension.	Diff.	Declination.	Diff.	ζ Cassiopeiæ. Mag. 3.7 Right Ascension.	Diff.	Declination.	Diff.	π Andromedæ. Mag. 4.4 Right Ascension.	Diff.	Declination.	Diff.
	h m 0 25		° ′ − 4 23		h m 0 31		° ′ − 4 1		h m 0 32		° ′ +53 27		h m 0 32		° ′ +33 16	
	s		″		s		″		s		″		s		″	
Jan. 0.2	55.276	114	73.43	66	5.678	115	75.23	67	28.440	256	26.52	50	34.218	154	41.40	73
10.2	55.162	112	74.09	56	5.563	112	75.90	58	28.184	256	26.02	99	34.064	154	40.67	101
20.2	55.050	105	74.65	44	5.451	106	76.48	45	27.928	245	25.03	142	33.910	148	39.66	130
30.2	54.945	93	75.09	29	5.345	95	76.93	32	27.683	221	23.61	183	33.762	133	38.36	150
Feb. 9.1	54.852	74	75.38	13	5.250	78	77.25	14	27.462	187	21.78	214	33.629	111	36.86	167
19.1	54.778	53	75.51	— 6	5.172	56	77.39	— 4	27.275	141	19.64	236	33.518	82	35.19	173
Mar. 1.1	54.725	24	75.45	27	5.116	28	77.35	25	27.134	86	17.28	248	33.436	47	33.46	174
11.1	54.701	— 9	75.18	49	5.088	— 3	77.10	47	27.048	24	14.80	250	33.389	4	31.72	165
21.0	54.710	45	74.69	73	5.091	41	76.63	70	27.024	— 45	12.30	242	33.385	— 45	30.07	149
31.0	54.755	85	73.96	97	5.132	81	75.93	94	27.069	114	9.88	223	33.430	95	28.58	126
Apr. 10.0	54.840	126	72.99	121	5.213	122	74.99	119	27.183	186	7.65	195	33.525	145	27.32	97
19.9	54.966	167	71.78	143	5.335	162	73.80	140	27.369	252	5.70	160	33.670	192	26.35	62
29.9	55.133	204	70.35	165	5.497	201	72.40	162	27.621	314	4.10	118	33.862	239	25.73	25
May 9.9	55.337	238	68.70	180	5.698	234	70.78	179	27.935	365	2.92	72	34.101	277	25.48	— 15
19.9	55.575	267	66.90	194	5.932	265	68.99	192	28.300	408	2.20	24	34.378	312	25.63	54
29.8	55.842	289	64.96	202	6.197	287	67.07	200	28.708	439	1.96	— 25	34.690	335	26.17	91
June 8.8	56.131	305	62.94	205	6.484	304	65.07	204	29.147	458	2.21	73	35.025	352	27.08	129
18.8	56.436	310	60.89	202	6.788	311	63.03	203	29.605	464	2.94	120	35.377	358	28.37	161
28.8	56.746	309	58.87	196	7.099	310	61.00	196	30.069	460	4.14	163	35.735	353	29.98	188
July 8.7	57.055	298	56.91	182	7.409	300	59.04	184	30.529	442	5.77	202	36.088	343	31.86	212
18.7	57.353	283	55.09	165	7.709	285	57.20	165	30.971	416	7.79	235	36.431	322	33.98	230
28.7	57.636	258	53.44	144	7.994	261	55.55	146	31.387	381	10.14	264	36.753	295	36.28	242
Aug. 7.6	57.894	230	52.00	119	8.255	234	54.09	121	31.768	337	12.78	285	37.048	262	38.70	248
17.6	58.124	195	50.81	94	8.489	200	52.88	95	32.105	290	15.63	302	37.310	226	41.18	250
27.6	58.319	159	49.87	64	8.689	165	51.93	67	32.395	237	18.65	311	37.536	187	43.68	246
Sept. 6.6	58.478	122	49.23	38	8.854	128	51.26	40	32.632	183	21.76	314	37.723	145	46.14	238
16.5	58.600	85	48.85	11	8.982	91	50.86	13	32.815	128	24.90	311	37.868	104	48.52	225
26.5	58.685	50	48.74	— 14	9.073	54	50.73	— 11	32.943	74	28.01	302	37.972	65	50.77	207
Oct. 6.5	58.735	15	48.88	33	9.127	21	50.84	33	33.017	22	31.03	286	38.037	27	52.84	189
16.5	58.750	— 15	49.21	52	9.148	— 8	51.17	50	33.039	— 28	33.89	265	38.064	— 7	54.73	165
26.4	58.735	40	49.73	65	9.140	36	51.67	65	33.011	75	36.54	239	38.057	39	56.38	140
Nov. 5.4	58.695	63	50.38	76	9.104	57	52.32	76	32.936	119	38.93	206	38.018	68	57.78	110
15.4	58.632	81	51.14	82	9.047	77	53.08	81	32.817	158	40.99	167	37.950	93	58.88	80
25.3	58.551	95	51.96	83	8.970	92	53.89	83	32.659	191	42.66	126	37.857	114	59.68	49
Dec. 5.3	58.456	106	52.79	83	8.878	103	54.72	83	32.468	222	43.92	78	37.743	132	60.17	14
15.3	58.350	114	53.62	79	8.775	112	55.55	80	32.246	242	44.70	30	37.611	146	60.31	— 20
25.3	58.236	118	54.41	72	8.663	116	56.35	73	32.004	258	45.00	— 21	37.465	155	60.11	55
35.2	58.118		55.13		8.547		57.08		31.746		44.79		37.310		59.56	
Mean Place	54.320		76.81		4.690		78.65		27.051		4.75		33.017		25.15	
Sec δ, Tan δ	1.003		−0.077		1.002		−0.070		1.680		+1.349		1.196		+0.656	
$D_\psi \alpha$, $D_\omega \alpha$	+0.06		+0.01		+0.06		0.00		+0.07		−0.09		+0.06		−0.04	
$D_\psi \delta$, $D_\omega \delta$	+0.4		+0.1		+0.4		+0.1		+0.4		+0.1		+0.4		+0.1	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Andromedæ. Mag. 4.5				δ Andromedæ. Mag. 3.5				α Cassiopeiæ. (Schedir.) Var. 2.2–2.8				μ Phœnicis. Mag. 4.6			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 0 34		° ′ +28 52		h m 0 34		° ′ +30 25		h m 0 35		° ′ +56 5		h m 0 37		° ′ −46 31	
	s		″		s		″		s		″		s		″	
Jan. 0.2	17.468		34.49		60.755		19.30		55.523		58.25		30.704		57.36	
10.2	17.325	143	33.74	75	60.609	146	18.57	73	55.243	280	57.83	42	30.481	223	57.36	0
20.2	17.182	143	32.75	99	60.462	147	17.58	99	54.962	281	56.90	93	30.267	214	56.87	49
30.2	17.044	138	31.52	123	60.321	141	16.34	124	54.692	270	55.51	139	30.066	201	55.93	94
Feb. 9.1	16.920	124	30.12	140	60.193	128	14.91	143	54.448	244	53.69	182	29.886	180	54.53	140
19.1	16.815	105	28.61	151	60.086	107	13.36	155	54.240	208	51.54	215	29.734	152	52.72	181
Mar. 1.1	16.738	77	27.05	156	60.007	79	11.74	162	54.080	160	49.15	239	29.615	119	50.55	217
11.1	16.693	45	25.52	153	59.961	46	10.14	160	53.979	101	46.61	254	29.535	80	48.06	249
21.0	16.689	4	24.08	144	59.956	5	8.63	151	53.945	34	44.02	259	29.500	35	45.31	275
31.0	16.730	41	22.82	126	59.998	42	7.28	135	53.984	39	41.51	251	29.513	13	42.35	296
Apr. 10.0	16.819	89	21.79	103	60.087	89	6.18	110	54.097	113	39.16	235	29.578	65	39.24	311
19.9	16.955	136	21.06	73	60.226	139	5.36	82	54.287	190	37.09	207	29.698	120	36.06	318
29.9	17.139	184	20.64	42	60.412	186	4.87	49	54.547	260	35.36	173	29.871	173	32.86	320
May 9.9	17.367	228	20.60	4	60.643	231	4.75	12	54.873	326	34.04	132	30.096	225	29.71	315
19.9	17.633	266	20.93	33	60.913	270	4.99	24	55.255	382	33.18	86	30.369	273	26.69	302
29.8	17.932	299	21.62	69	61.216	303	5.63	64	55.681	426	32.81	37	30.684	315	23.85	284
June 8.8	18.254	322	22.67	105	61.543	327	6.62	99	56.143	462	32.93	12	31.034	350	21.28	257
18.8	18.592	338	24.04	137	61.885	342	7.96	134	56.624	481	33.55	62	31.408	374	19.04	224
28.8	18.937	345	25.71	167	62.235	350	9.60	164	57.114	490	34.65	110	31.798	390	17.16	188
July 8.7	19.280	343	27.61	190	62.581	346	11.48	188	57.600	486	36.19	154	32.193	395	15.72	144
18.7	19.611	331	29.72	211	62.917	336	13.59	211	58.069	469	38.15	196	32.583	390	14.74	98
28.7	19.923	312	31.96	224	63.235	318	15.84	225	58.510	441	40.45	230	32.957	374	14.26	48
Aug. 7.6	20.210	287	34.28	232	63.525	290	18.19	235	58.914	404	43.06	261	33.303	346	14.29	3
17.6	20.465	255	36.64	236	63.784	259	20.58	239	59.274	360	45.91	285	33.614	311	14.81	52
27.6	20.684	219	38.97	233	64.007	223	22.98	240	59.584	310	48.95	304	33.882	268	15.81	100
Sept. 6.6	20.867	183	41.24	227	64.194	187	25.31	233	59.840	256	52.10	315	34.101	219	17.23	142
16.5	21.009	142	43.39	215	64.339	145	27.55	224	60.039	199	55.30	320	34.266	165	19.04	181
26.5	21.111	102	45.41	202	64.444	105	29.64	209	60.179	140	58.50	320	34.374	108	21.17	213
Oct. 6.5	21.176	65	47.25	184	64.511	67	31.57	193	60.262	83	61.61	311	34.427	53	23.51	234
16.5	21.205	29	48.87	162	64.541	30	33.29	172	60.289	27	64.58	297	34.424	3	25.98	247
26.4	21.200	5	50.28	141	64.539	2	34.79	150	60.262	27	67.36	278	34.372	52	28.49	251
Nov. 5.4	21.165	35	51.42	114	64.505	34	36.02	123	60.184	78	69.87	251	34.275	97	30.93	244
15.4	21.103	62	52.31	89	64.443	62	37.00	98	60.059	125	72.05	218	34.138	137	33.19	226
25.3	21.019	84	52.91	60	64.357	86	37.68	68	59.890	169	73.86	181	33.968	170	35.17	198
Dec. 5.3	20.914	105	53.22	31	64.251	106	38.06	38	59.683	207	75.24	138	33.774	194	36.81	164
15.3	20.792	122	53.23	1	64.126	125	38.13	7	59.445	238	76.15	91	33.562	212	38.06	125
25.3	20.657	135	52.93	30	63.989	137	37.87	26	59.181	264	76.55	40	33.340	222	38.86	80
35.2	20.513	144	52.35	58	63.842	147	37.32	55	58.901	280	76.44	11	33.115	225	39.17	31
Mean Place	16.283		19.68		59.554		4.00		54.050		35.94		29.961		47.69	
Sec δ, Tan δ	1.142		+0.552		1.160		+0.587		1.792		+1.488		1.453		−1.055	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.06		−0.04		+0.06		−0.04		+0.07		−0.10		+0.06		+0.07	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.4		+0.1		+0.4		+0.2		+0.4		+0.2		+0.4		+0.2	

FOR THE UPPER TRANSIT AT W .

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	η Cassiopeiæ. Mag. 3.6 Right Ascension.		Declination.		δ Piscium. Mag. 4.6 Right Ascension.		Declination.		λ Hydri. Mag. 5.0 Right Ascension.		Declination.		20 Ceti. Mag. 4.9 Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	0 44		+57 23		0 44		+ 7 8		0 45		−75 21		0 48		− 1 34	
	s		″		s		″		s		″		s		″	
Jan. 0.3	13.030		36.35		29.818		47.37		47.56		64.45		53.109		57.36	
10.2	12.740	290	36.03	32	29.702	116	46.64	73	46.76	80	63.87	58	52.991	118	58.06	70
20.2	12.448	292	35.20	83	29.585	117	45.88	76	45.98	78	62.69	118	52.874	117	58.69	63
30.2	12.165	283	33.88	132	29.471	114	45.13	75	45.27	71	60.95	174	52.759	115	59.23	54
Feb. 9.1	11.907	258	32.15	173	29.366	105	44.41	72	44.61	66	58.69	226	52.653	106	59.64	41
19.1	11.685	222	30.05	210	29.275	91	43.77	64	44.04	57	55.98	271	52.561	92	59.90	26
Mar. 1.1	11.510	175	27.68	237	29.207	68	43.23	54	43.58	46	52.89	309	52.489	72	60.00	10
11.1	11.393	117	25.12	256	29.164	43	42.84	39	43.22	36	49.50	339	52.443	46	59.91	9
21.0	11.346	47	22.51	261	29.156	8	42.64	20	43.00	22	45.90	360	52.430	13	59.59	32
31.0	11.372	26	19.95	256	29.185	29	42.64	0	42.89	11	42.17	373	52.453	23	59.06	53
Apr. 10.0	11.478	106	17.53	242	29.254	69	42.90	26	42.92	3	38.38	379	52.515	62	58.27	79
20.0	11.662	184	15.36	217	29.366	112	43.41	51	43.10	18	34.62	376	52.619	104	57.25	102
29.9	11.920	258	13.51	185	29.520	154	44.18	77	43.39	29	30.97	365	52.765	146	55.99	126
May 9.9	12.248	328	12.06	145	29.715	195	45.22	104	43.82	43	27.51	346	52.950	185	54.52	147
19.9	12.636	388	11.06	100	29.945	230	46.51	129	44.36	54	24.32	319	53.173	223	52.85	167
29.8	13.073	437	10.54	52	30.207	262	48.02	151	45.02	66	21.46	286	53.427	254	51.02	183
June 8.8	13.545	472	10.51	3	30.492	285	49.72	170	45.76	74	19.01	245	53.706	279	49.09	193
18.8	14.043	498	10.98	47	30.796	304	51.55	183	46.58	82	17.01	200	54.003	297	47.09	200
28.8	14.551	508	11.94	96	31.108	312	53.47	192	47.44	86	15.53	148	54.311	308	45.08	201
July 8.7	15.057	506	13.34	140	31.421	313	55.44	197	48.32	88	14.60	93	54.621	310	43.12	196
18.7	15.547	490	15.18	184	31.726	305	57.40	196	49.22	90	14.24	36	54.924	303	41.24	188
28.7	16.013	466	17.38	220	32.017	291	59.30	190	50.09	87	14.47	23	55.214	290	39.51	173
Aug. 7.7	16.442	429	19.90	252	32.287	270	61.09	179	50.90	81	15.27	80	55.484	270	37.97	154
17.6	16.828	386	22.68	278	32.528	241	62.72	163	51.64	74	16.63	136	55.727	243	36.65	132
27.6	17.164	336	25.66	298	32.738	210	64.18	146	52.29	65	18.49	186	55.940	213	35.58	107
Sept. 6.6	17.444	280	28.78	312	32.915	178	65.42	124	52.80	51	20.80	231	56.118	178	34.78	80
16.5	17.666	222	31.96	318	33.056	141	66.45	103	53.18	38	23.49	269	56.262	144	34.24	54
26.5	17.830	164	35.15	319	33.161	105	67.23	78	53.41	23	26.43	294	56.370	108	33.98	26
Oct. 6.5	17.935	105	38.29	314	33.231	70	67.79	56	53.48	7	29.54	311	56.442	72	33.95	3
16.5	17.980	45	41.30	301	33.269	38	68.13	34	53.39	9	32.69	315	56.482	40	34.16	21
26.4	17.970	10	44.13	283	33.276	7	68.25	12	53.16	23	35.75	306	56.490	8	34.55	39
Nov. 5.4	17.907	63	46.71	258	33.256	20	68.20	5	52.77	39	38.61	286	56.471	19	35.09	54
15.4	17.794	113	48.98	227	33.212	44	67.97	23	52.26	51	41.15	254	56.429	42	35.76	67
25.4	17.633	161	50.90	192	33.147	65	67.61	36	51.64	62	43.28	213	56.364	65	36.51	75
Dec. 5.3	17.430	203	52.38	148	33.065	82	67.13	48	50.93	71	44.90	162	56.282	82	37.31	80
15.3	17.193	237	53.40	102	32.970	95	66.54	59	50.17	76	45.96	106	56.186	96	38.12	81
25.3	16.926	267	53.92	52	32.861	109	65.88	66	49.37	80	46.40	44	56.078	108	38.91	79
35.2	16.639	287	53.91	1	32.744	117	65.16	72	48.56	81	46.24	16	55.961	117	39.68	77
Mean Place	11.422		13.95		28.692		40.23		47.458		50.28		52.004		61.29	
Sec δ, Tan δ	1.856		+1.563		1.008		+0.125		3.957		−3.828		1.000		−0.028	
$D_\psi a$, $D_\omega a$	+0.07		−0.10		+0.06		−0.01		+0.04		+0.26		+0.06		0.00	
$D_\psi \delta$, $D_\omega \delta$	+0.4		+0.2		+0.4		+0.2		+0.4		+0.2		+0.4		+0.2	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cassiopeiæ. Mag. 2.2 Right Ascension.		Declination.		μ Andromedæ. Mag. 3.9 Right Ascension.		Declination.		α Sculptoris. Mag. 4.4 Right Ascension.		Declination.		ε Piscium. Mag. 4.4 Right Ascension.		Declination.	
	h m 0 51		° ′ +60 16		h m 0 52		° ′ +38 3		h m 0 54		° ′ −29 47		h m 0 58		° ′ + 7 27	
	s		″		s		″		s		″		s		″	
Jan. 0.3	50.22		65.10		16.515		54.18		43.131		48.33		45.470		22.52	
10.2	49.90	32	64.95	15	16.346	169	53.67	51	42.975	156	48.80	47	45.353	117	21.80	72
20.2	49.56	34	64.26	69	16.173	173	52.80	87	42.819	156	48.90	10	45.230	123	21.06	74
30.2	49.24	32	63.06	120	16.002	171	51.61	119	42.668	151	48.64	26	45.110	120	20.32	74
Feb. 9.2	48.94	30	61.40	166	15.844	158	50.16	145	42.528	140	48.02	62	44.997	113	19.63	69
19.1	48.67	27	59.34	206	15.704	140	48.49	167	42.406	122	47.05	97	44.896	101	18.99	64
Mar. 1.1	48.46	21	56.99	235	15.594	110	46.68	181	42.306	100	45.74	131	44.816	80	18.45	54
11.1	48.32	14	54.42	257	15.521	73	44.81	187	42.236	70	44.12	162	44.760	56	18.05	40
21.0	48.25	7	51.76	266	15.492	29	42.97	184	42.201	35	42.23	189	44.737	23	17.84	21
31.0	48.25	0	49.11	265	15.512	20	41.24	173	42.205	4	40.07	216	44.752	15	17.82	2
Apr. 10.0	48.34	9	46.60	251	15.586	74	39.70	154	42.252	47	37.71	236	44.807	55	18.04	22
20.0	48.52	18	44.29	231	15.714	128	38.42	128	42.344	92	35.17	254	44.905	98	18.51	47
29.9	48.78	26	42.30	199	15.896	182	37.45	97	42.483	139	32.52	265	45.046	141	19.25	74
May 9.9	49.11	33	40.69	161	16.128	232	36.85	60	42.666	183	29.81	271	45.228	182	20.24	99
19.9	49.52	41	39.52	117	16.405	277	36.64	21	42.891	225	27.08	273	45.449	221	21.48	124
29.9	49.98	46	38.82	70	16.720	315	36.83	19	43.152	261	24.41	267	45.702	253	22.93	145
June 8.8	50.48	50	38.63	19	17.064	344	37.43	60	43.444	292	21.87	254	45.981	279	24.58	165
18.8	51.00	52	38.93	30	17.428	364	38.40	97	43.759	315	19.50	237	46.280	299	26.37	179
28.8	51.54	54	39.73	80	17.802	374	39.75	135	44.088	329	17.38	212	46.590	310	28.26	189
July 8.7	52.08	54	41.01	128	18.176	374	41.42	167	44.423	335	15.55	183	46.902	312	30.19	193
18.7	52.61	53	42.72	171	18.542	366	43.35	193	44.755	332	14.08	147	47.209	307	32.12	193
28.7	53.11	50	44.83	211	18.890	348	45.53	218	45.075	320	12.99	109	47.505	296	34.00	188
Aug. 7.7	53.57	46	47.28	245	19.214	324	47.87	234	45.375	300	12.32	67	47.781	276	35.78	178
17.6	53.98	41	50.01	273	19.506	292	50.34	247	45.647	272	12.09	23	48.031	250	37.40	162
27.6	54.35	37	52.98	297	19.762	256	52.87	253	45.887	240	12.27	18	48.252	221	38.85	145
Sept. 6.6	54.67	32	56.11	313	19.979	217	55.42	255	46.088	201	12.88	61	48.441	189	40.09	124
16.6	54.92	25	59.34	323	20.156	177	57.93	251	46.249	161	13.85	97	48.596	155	41.12	103
26.5	55.10	18	62.60	326	20.291	135	60.36	243	46.366	117	15.17	132	48.715	119	41.90	78
Oct. 6.5	55.23	13	65.84	324	20.385	94	62.67	231	46.441	75	16.76	159	48.799	84	42.47	57
16.5	55.29	6	68.98	314	20.438	53	64.79	212	46.475	34	18.54	178	48.852	53	42.82	35
26.4	55.29	0	71.95	297	20.455	17	66.73	194	46.471	4	20.45	191	48.873	21	42.95	13
Nov. 5.4	55.23	6	74.71	276	20.435	20	68.42	169	46.431	40	22.40	195	48.867	6	42.91	4
15.4	55.10	13	77.15	244	20.383	52	69.84	142	46.361	70	24.31	191	48.835	32	42.69	22
25.4	54.93	17	79.25	210	20.301	82	70.95	111	46.265	96	26.09	178	48.782	53	42.34	35
Dec. 5.3	54.71	22	80.92	167	20.192	109	71.73	78	46.146	119	27.69	160	48.707	75	41.87	47
15.3	54.45	26	82.13	121	20.059	133	72.17	44	46.011	135	29.02	133	48.617	90	41.30	57
25.3	54.15	30	82.82	69	19.908	151	72.24	7	45.863	148	30.06	104	48.512	105	40.66	64
35.3	53.83	32	82.99	17	19.741	167	71.93	31	45.707	156	30.76	70	48.396	116	39.94	72
Mean Place	48.432		42.30		15.104		36.91		42.150		42.77		44.253		15.58	
Sec δ, Tan δ	2.017		+1.752		1.270		+0.783		1.152		−0.573		1.008		+0.131	
$D_\psi\alpha$, $D_\omega\alpha$	+0.07		−0.11		+0.07		−0.05		+0.06		+0.04		+0.06		−0.01	
$D_\psi\delta$, $D_\omega\delta$	+0.4		+0.2		+0.4		+0.2		+0.4		+0.2		+0.4		+0.2	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Phœnicis. Mag. 3.4				μ Cassiopeiæ. Mag. 5.3				η Ceti. Mag. 3.6				β Andromedæ. Mag. 2.4			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 1 2		° ′ −47 8		h m 1 2		° ′ +54 31		h m 1 4		° ′ −10 36		h m 1 5		° ′ +35 11	
	s		″		s		″		s		″		s		″	
Jan. 0.3	29.074		79.71		53.935		46.49		32.041		39.93		12.955		45.16	
10.2	28.840	234	79.98	27	53.685	250	46.30	19	31.919	122	40.63	70	12.798	157	44.71	45
20.2	28.607	233	79.75	23	53.425	260	45.62	68	31.794	125	41.17	54	12.632	166	43.93	78
30.2	28.382	225	79.03	72	53.169	256	44.47	115	31.669	125	41.50	33	12.468	164	42.86	107
Feb. 9.2	28.174	208	77.83	120	52.928	241	42.91	156	31.551	118	41.62	12	12.310	158	41.54	132
19.1	27.988	186	76.20	163	52.714	214	40.99	192	31.445	106	41.52	10	12.169	141	40.03	151
Mar. 1.1	27.832	156	74.16	204	52.540	174	38.77	222	31.359	86	41.19	33	12.053	116	38.37	166
11.1	27.714	118	71.79	237	52.416	124	36.37	240	31.295	64	40.62	57	11.971	82	36.67	170
21.0	27.639	75	69.10	269	52.353	63	33.89	248	31.263	32	39.80	82	11.930	41	34.98	169
31.0	27.612	27	66.17	293	52.360	7	31.41	248	31.268	5	38.74	106	11.937	7	33.41	157
Apr. 10.0	27.638	26	63.07	310	52.438	78	29.05	236	31.311	43	37.44	130	11.994	57	32.00	141
20.0	27.721	83	59.84	323	52.590	152	26.91	214	31.397	86	35.92	152	12.104	110	30.84	116
29.9	27.858	137	56.56	328	52.814	224	25.05	186	31.526	129	34.19	173	12.267	163	29.96	88
May 9.9	28.051	193	53.31	325	53.106	292	23.56	149	31.696	170	32.29	190	12.480	213	29.43	53
19.9	28.295	244	50.14	317	53.457	351	22.48	108	31.905	209	30.25	204	12.738	258	29.27	16
29.9	28.585	290	47.16	298	53.859	402	21.85	63	32.148	243	28.11	214	13.035	297	29.49	22
June 8.8	28.915	330	44.39	277	54.301	442	21.69	16	32.419	271	25.94	217	13.362	327	30.08	59
18.8	29.276	361	41.95	244	54.771	470	22.00	31	32.712	293	23.78	216	13.712	350	31.03	95
28.8	29.658	382	39.86	209	55.254	483	22.78	78	33.018	306	21.69	209	14.074	362	32.32	129
July 8.7	30.052	394	38.20	166	55.742	488	23.99	121	33.329	311	19.72	197	14.439	365	33.91	159
18.7	30.446	394	37.00	120	56.221	479	25.61	162	33.636	307	17.93	179	14.799	360	35.75	184
28.7	30.830	384	36.32	68	56.681	460	27.59	198	33.934	298	16.37	156	15.143	344	37.81	206
Aug. 7.7	31.193	363	36.14	18	57.111	430	29.88	229	34.215	281	15.07	130	15.466	323	40.03	222
17.6	31.526	333	36.48	34	57.505	394	32.44	256	34.470	255	14.06	101	15.761	295	42.35	232
27.6	31.819	293	37.33	85	57.856	351	35.19	275	34.697	227	13.38	68	16.023	262	44.72	237
Sept. 6.6	32.067	248	38.65	132	58.158	302	38.09	290	34.891	194	13.02	36	16.248	225	47.10	238
16.6	32.264	197	40.39	174	58.409	251	41.07	298	35.049	158	12.98	4	16.436	188	49.44	234
26.5	32.406	142	42.49	210	58.605	196	44.06	299	35.171	122	13.24	26	16.583	147	51.69	225
Oct. 6.5	32.493	87	44.85	236	58.748	143	47.02	296	35.259	88	13.77	53	16.691	108	53.81	212
16.5	32.526	33	47.40	255	58.837	89	49.89	287	35.311	52	14.53	76	16.761	70	55.78	197
26.4	32.505	21	50.03	263	58.873	36	52.60	271	35.331	20	15.48	95	16.794	33	57.56	178
Nov. 5.4	32.436	69	52.61	258	58.858	15	55.08	248	35.323	8	16.55	107	16.794	0	59.11	155
15.4	32.324	112	55.06	245	58.795	63	57.28	220	35.287	36	17.70	115	16.760	34	60.42	131
25.4	32.173	151	57.28	222	58.685	110	59.17	189	35.228	59	18.87	117	16.695	65	61.44	102
Dec. 5.3	31.993	180	59.19	191	58.534	151	60.66	149	35.148	80	20.01	114	16.605	90	62.16	72
15.3	31.787	206	60.70	151	58.345	189	61.72	106	35.052	96	21.09	108	16.489	116	62.57	41
25.3	31.564	223	61.78	108	58.126	219	62.33	61	34.943	109	22.05	96	16.352	137	62.63	6
35.3	31.332	232	62.37	59	57.880	246	62.45	12	34.822	121	22.86	81	16.199	153	62.36	27
Mean Place	28.165		69.49		52.150		25.22		30.897		40.39		11.466		29.10	
Sec δ, Tan δ	1.470		−1.078		1.723		+1.403		1.017		−0.187		1.224		+0.705	
Dψα, Dωα	+0.05		+0.07		+0.07		−0.09		+0.06		+0.01		+0.07		−0.05	
Dψδ, Dωδ	+0.4		+0.3		+0.4		+0.3		+0.4		+0.3		+0.4		+0.3	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	υ Piscium. Mag. 4.7 Right Ascension.		υ Piscium. Declination.		θ Ceti. Mag. 3.8 Right Ascension.		θ Ceti. Declination.	
	h m		° ′		h m		° ′	
	1 15		+26 50		1 19		− 8 35	
	s		″		s		″	
Jan. 0.3	2.077	136	32.47	50	59.684	121	62.60	76
10.3	1.941	145	31.97	74	59.563	128	63.36	61
20.2	1.796	147	31.23	94	59.435	130	63.97	42
30.2	1.649	143	30.29	112	59.305	126	64.39	23
Feb. 9.2	1.506	130	29.17	124	59.179	115	64.62	2
19.1	1.376	110	27.93	131	59.064	100	64.64	21
Mar. 1.1	1.266	80	26.62	131	58.964	76	64.43	43
11.1	1.186	45	25.31	126	58.888	47	64.00	68
21.1	1.141	3	24.05	113	58.841	11	63.32	91
31.0	1.138	44	22.92	95	58.830	29	62.41	116
Apr. 10.0	1.182	93	21.97	71	58.859	70	61.25	139
20.0	1.275	142	21.26	44	58.929	114	59.86	160
30.0	1.417	188	20.82	13	59.043	157	58.26	179
May 9.9	1.605	232	20.69	21	59.200	196	56.47	194
19.9	1.837	269	20.90	52	59.396	231	54.53	205
29.9	2.106	300	21.42	86	59.627	262	52.48	213
June 8.8	2.406	321	22.28	115	59.889	285	50.35	213
18.8	2.727	336	23.43	142	60.174	300	48.22	208
28.8	3.063	341	24.85	165	60.474	308	46.14	198
July 8.8	3.404	337	26.50	183	60.782	307	44.16	183
18.7	3.741	326	28.33	197	61.089	299	42.33	162
28.7	4.067	307	30.30	206	61.388	284	40.71	138
Aug. 7.7	4.374	283	32.36	209	61.672	261	39.33	109
17.7	4.657	252	34.45	208	61.933	236	38.24	79
27.6	4.909	220	36.53	204	62.169	205	37.45	48
Sept. 6.6	5.129	186	38.57	194	62.374	171	36.97	15
16.6	5.315	148	40.51	182	62.545	137	36.82	15
26.5	5.463	112	42.33	166	62.682	103	36.97	42
Oct. 6.5	5.575	78	43.99	149	62.785	68	37.39	67
16.5	5.653	44	45.48	130	62.853	36	38.06	85
26.5	5.697	12	46.78	107	62.889	7	38.91	101
Nov. 5.4	5.709	18	47.85	87	62.896	21	39.92	110
15.4	5.691	45	48.72	63	62.875	46	41.02	114
25.4	5.646	71	49.35	39	62.829	68	42.16	113
Dec. 5.4	5.575	95	49.74	13	62.761	87	43.29	108
15.3	5.480	115	49.87	12	62.674	104	44.37	99
25.3	5.365	131	49.75	36	62.570	118	45.36	87
35.3	5.234		49.39		62.452		46.23	
Mean Place	0.602		19.32		58.440		63.43	
Sec δ, Tan δ	1.121		+0.506		1.011		−0.151	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		−0.03		+0.06		+0.01	
$D_\psi\delta$, $D_\omega\delta$	+0.4		+0.3		+0.4		+0.3	

Washington Mean Time.	δ Cassiopeiæ. Mag. 2.8 Right Ascension.		δ Cassiopeiæ. Declination.		γ Phœnicis. Mag. 3.4 Right Ascension.		γ Phœnicis. Declination.	
	h m		° ′		h m		° ′	
	1 20		+59 48		1 24		−43 43	
	s		″		s		″	
Jan. 0.3	32.440	309	75.62	17	52.011	216	69.03	[illegible]
10.3	32.131	325	75.79	35	51.795	221	69.61	9
20.2	31.806	328	75.44	87	51.574	219	69.70	[illegible]
30.2	31.478	316	74.57	135	51.355	209	69.31	[illegible]
Feb. 9.2	31.162	289	73.22	176	51.146	193	68.46	[illegible]
19.1	30.873	246	71.46	212	50.953	168	67.14	[illegible]
Mar. 1.1	30.627	189	69.34	237	50.785	138	65.41	[illegible]
11.1	30.438	121	66.97	253	50.647	98	63.31	[illegible]
21.1	30.317	43	64.44	257	50.549	54	60.89	[illegible]
31.0	30.274	40	61.87	253	50.495	4	58.18	[illegible]
Apr. 10.0	30.314	125	59.34	237	50.491	50	55.26	[illegible]
20.0	30.439	209	56.97	212	50.541	103	52.17	[illegible]
30.0	30.648	289	54.85	178	50.644	157	48.99	[illegible]
May 9.9	30.937	360	53.07	142	50.801	209	45.78	[illegible]
19.9	31.297	423	51.65	97	51.010	256	42.61	[illegible]
29.9	31.720	470	50.68	51	51.266	298	39.57	[illegible]
June 8.8	32.190	509	50.17	2	51.564	330	36.70	[illegible]
18.8	32.699	530	50.15	45	51.894	356	34.10	[illegible]
28.8	33.229	541	50.60	92	52.250	371	31.82	[illegible]
July 8.8	33.770	534	51.52	137	52.621	376	29.98	[illegible]
18.7	34.304	521	52.89	177	52.997	371	28.47	[illegible]
28.7	34.825	492	54.66	213	53.368	354	27.49	[illegible]
Aug. 7.7	35.317	454	56.79	243	53.722	331	27.03	5
17.7	35.771	411	59.22	270	54.053	298	27.08	[illegible]
27.6	36.182	359	61.92	289	54.351	259	27.64	[illegible]
Sept. 6.6	36.541	303	64.81	304	54.610	214	28.69	[illegible]
16.6	36.844	246	67.85	312	54.824	165	30.20	[illegible]
26.5	37.090	183	70.97	313	54.989	115	32.08	[illegible]
Oct. 6.5	37.273	122	74.10	308	55.104	65	34.30	[illegible]
16.5	37.395	62	77.18	297	55.169	14	36.74	[illegible]
26.5	37.457	1	80.15	282	55.183	32	39.32	[illegible]
Nov. 5.4	37.456	60	82.97	255	55.151	75	41.92	[illegible]
15.4	37.396	117	85.52	225	55.076	113	44.44	[illegible]
25.4	37.279	171	87.77	189	54.963	146	46.79	[illegible]
Dec. 5.4	37.108	221	89.66	146	54.817	175	48.87	[illegible]
15.3	36.887	264	91.12	99	54.642	195	50.60	[illegible]
25.3	36.623	297	92.11	48	54.447	212	51.93	[illegible]
35.3	36.326		92.59		54.235		52.82	
Mean Place	30.250		53.84		50.929		59.31	
Sec δ, Tan δ	1.990		+1.720		1.38[illegible]		−0.957	
$D_\psi\alpha$, $D_\omega\alpha$	+0.08		−0.11		+0.05		+0.06	
$D_\psi\delta$, $D_\omega\delta$	+0.4		+0.3		+0.4		+0.4	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	38 Cassiopeiæ. Mag. 6.0 Right Ascension.		38 Cassiopeiæ. Declination.		η Piscium. Mag. 3.7 Right Ascension.		η Piscium. Declination.		40 Cassiopeiæ. Mag. 5.5 Right Ascension.		40 Cassiopeiæ. Declination.		υ Andromedæ. Mag. 4.2 Right Ascension.		υ Andromedæ. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	1 25		+69 50		1 27		+14 55		1 31		+72 37		1 32		+41 0	
	s		″		s		″		s		″		s		″	
Jan. 0.3	13.55	49	77.43	46	10.197	120	52.11	61	64.15	57	63.96	62	3.974	172	19.85	15
10.3	13.06	52	77.89	12	10.077	129	51.50	72	63.58	62	64.58	2	3.802	186	19.70	50
20.2	12.54	52	77.77	70	9.948	133	50.78	78	62.96	62	64.60	56	3.616	194	19.20	86
30.2	12.02	50	77.07	124	9.815	132	50.00	82	62.34	60	64.04	114	3.422	190	18.34	119
Feb. 9.2	11.52	46	75.83	174	9.683	122	49.18	85	61.74	55	62.90	165	3.232	178	17.15	144
19.1	11.06	40	74.09	216	9.561	106	48.33	81	61.19	48	61.25	211	3.054	155	15.71	166
Mar. 1.1	10.66	32	71.93	250	9.455	82	47.52	73	60.71	38	59.14	248	2.899	122	14.05	180
11.1	10.34	20	69.43	272	9.373	51	46.79	63	60.33	28	56.66	272	2.777	80	12.25	185
21.1	10.14	10	66.71	283	9.322	13	46.16	46	60.05	14	53.94	287	2.697	30	10.40	182
31.0	10.04	2	63.88	283	9.309	28	45.70	26	59.91	1	51.07	290	2.667	24	8.58	171
Apr. 10.0	10.06	15	61.05	273	9.337	74	45.44	3	59.90	14	48.17	281	2.691	82	6.87	154
20.0	10.21	26	58.32	251	9.411	119	45.41	23	60.04	28	45.36	262	2.773	141	5.33	128
30.0	10.47	38	55.81	220	9.530	164	45.64	49	60.32	41	42.74	235	2.914	197	4.05	99
May 9.9	10.85	48	53.61	183	9.694	206	46.13	78	60.73	53	40.39	198	3.111	249	3.06	64
19.9	11.33	57	51.78	139	9.900	241	46.91	102	61.26	63	38.41	155	3.360	294	2.42	26
29.9	11.90	64	50.39	91	10.141	273	47.93	127	61.89	71	36.86	108	3.654	330	2.16	13
June 8.8	12.54	69	49.48	41	10.414	295	49.20	146	62.60	78	35.78	58	3.984	361	2.29	50
18.8	13.23	74	49.07	11	10.709	312	50.66	165	63.38	83	35.20	6	4.345	379	2.79	88
28.8	13.97	75	49.18	61	11.021	319	52.31	175	64.21	84	35.14	45	4.724	387	3.67	121
July 8.8	14.72	74	49.79	111	11.340	318	54.06	183	65.05	85	35.59	97	5.111	387	4.88	153
18.7	15.46	71	50.90	157	11.658	308	55.89	186	65.90	82	36.56	144	5.498	377	6.41	180
28.7	16.17	69	52.47	200	11.966	294	57.75	184	66.72	79	38.00	186	5.875	350	8.21	201
Aug. 7.7	16.86	64	54.47	237	12.260	274	59.59	177	67.51	74	39.86	228	6.234	335	10.22	220
17.7	17.50	58	56.84	270	12.534	245	61.36	165	68.25	67	42.14	263	6.569	304	12.42	231
27.6	18.08	51	59.54	297	12.779	216	63.01	152	68.92	60	44.77	291	6.873	267	14.73	239
Sept. 6.6	18.59	43	62.51	317	12.995	186	64.53	135	69.52	51	47.68	316	7.140	232	17.12	241
16.6	19.02	35	65.68	332	13.181	150	65.88	115	70.03	42	50.84	332	7.372	190	19.53	238
26.5	19.37	26	69.00	339	13.331	118	67.03	97	70.45	31	54.16	343	7.562	150	21.91	233
Oct. 6.5	19.63	16	72.39	340	13.449	86	68.00	75	70.76	22	57.59	345	7.712	110	24.24	221
16.5	19.79	8	75.79	333	13.535	53	68.75	57	70.98	10	61.04	342	7.822	70	26.45	206
26.5	19.87	1	79.12	318	13.588	24	69.32	37	71.08	0	64.46	330	7.892	32	28.51	189
Nov. 5.4	19.86	10	82.30	296	13.612	4	69.69	19	71.08	11	67.76	309	7.924	7	30.40	165
15.4	19.76	20	85.26	267	13.608	31	69.88	1	70.97	21	70.85	282	7.917	42	32.05	140
25.4	19.56	28	87.93	230	13.577	54	69.89	13	70.76	32	73.67	245	7.875	78	33.45	111
Dec. 5.4	19.28	35	90.23	186	13.523	77	69.76	30	70.44	42	76.12	203	7.797	110	34.56	78
15.3	18.93	42	92.09	136	13.446	96	69.46	43	70.02	49	78.15	152	7.687	139	35.34	44
25.3	18.51	48	93.45	81	13.350	114	69.03	55	69.53	55	79.67	98	7.548	163	35.78	8
35.3	18.03		94.26		13.236		68.48		68.98		80.65		7.385		35.86	
Mean Place	10.654		54.15		8.748		43.29		60.786		40.60		2.169		3.03	
Sec δ, Tan δ	2.903		+2.726		1.035		+0.267		3.350		+3.198		1.325		+0.870	
$D_\psi \alpha$, $D_\omega \alpha$	+0.09		−0.18		+0.06		−0.02		+0.09		−0.20		+0.07		−0.05	
$D_\psi \delta$, $D_\omega \delta$	+0.4		+0.4		+0.4		+0.4		+0.4		+0.4		+0.4		+0.4	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ν Piscium. Mag. 4.7				φ Persei. Mag. 4.2				τ Ceti. Mag. 3.6				ο Piscium. Mag. 4.5			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 1 37		° ′ + 5 4		h m 1 38		° ′ +50 16		h m 1 40		° ′ −16 21		h m 1 41		° ′ + 8 45	
	s		″		s		″		s		″		s		″	
Jan. 0.3	14.288	113	46.62	71	36.539	217	71.46	14	19.563	132	51.10	80	8.331	114	8.09	66
10.3	14.175	124	45.91	68	36.322	235	71.60	31	19.431	142	51.90	57	8.217	125	7.43	70
20.2	14.051	131	45.23	65	36.087	244	71.29	75	19.289	146	52.47	29	8.092	132	6.73	68
30.2	13.920	130	44.58	60	35.843	241	70.54	115	19.143	146	52.76	2	7.960	133	6.05	67
Feb. 9.2	13.790	123	43.98	51	35.602	227	69.39	151	18.997	137	52.78	27	7.827	127	5.38	62
19.2	13.667	109	43.47	40	35.375	199	67.88	180	18.860	121	52.51	54	7.700	112	4.76	54
Mar. 1.1	13.558	88	43.07	25	35.176	160	66.08	202	18.739	101	51.97	84	7.588	91	4.22	43
11.1	13.470	58	42.82	10	35.016	110	64.06	216	18.638	71	51.13	110	7.497	62	3.79	28
21.1	13.412	24	42.72	11	34.906	51	61.90	220	18.567	36	50.03	137	7.435	27	3.51	11
31.0	13.388	16	42.83	32	34.855	13	59.70	212	18.531	4	48.66	162	7.408	14	3.40	9
Apr. 10.0	13.404	59	43.15	55	34.868	81	57.58	200	18.535	45	47.04	184	7.422	57	3.49	33
20.0	13.463	103	43.70	80	34.949	151	55.58	176	18.580	91	45.20	204	7.479	102	3.82	57
30.0	13.566	147	44.50	101	35.100	215	53.82	147	18.671	136	43.16	219	7.581	146	4.39	82
May 9.9	13.713	187	45.51	127	35.315	276	52.35	112	18.807	177	40.97	231	7.727	188	5.21	104
19.9	13.900	226	46.78	144	35.591	331	51.23	73	18.984	216	38.66	238	7.915	225	6.25	127
29.9	14.126	257	48.22	163	35.922	373	50.50	32	19.200	249	36.28	238	8.140	258	7.52	146
June 8.9	14.383	281	49.85	175	36.295	408	50.18	12	19.449	274	33.90	234	8.398	283	8.98	163
18.8	14.664	298	51.60	182	36.703	431	50.30	53	19.723	294	31.56	224	8.681	300	10.61	173
28.8	14.962	309	53.42	186	37.134	442	50.83	93	20.017	306	29.32	206	8.981	310	12.34	179
July 8.8	15.271	310	55.28	185	37.576	444	51.76	131	20.323	309	27.26	184	9.291	312	14.13	182
18.7	15.581	302	57.13	178	38.020	434	53.07	166	20.632	302	25.42	156	9.603	305	15.95	179
28.7	15.883	290	58.91	165	38.454	416	54.73	195	20.934	291	23.86	125	9.908	293	17.74	170
Aug. 7.7	16.173	271	60.56	150	38.870	388	56.68	222	21.225	273	22.61	91	10.201	275	19.44	158
17.7	16.444	245	62.06	131	39.258	356	58.90	241	21.498	246	21.70	53	10.476	250	21.02	142
27.6	16.689	218	63.37	108	39.614	316	61.31	258	21.744	218	21.17	16	10.726	222	22.44	122
Sept. 6.6	16.907	188	64.45	85	39.930	274	63.89	267	21.962	186	21.01	22	10.948	194	23.66	103
16.6	17.095	154	65.30	60	40.204	229	66.56	271	22.148	150	21.23	54	11.142	160	24.69	79
26.6	17.249	123	65.90	37	40.433	183	69.27	270	22.298	116	21.77	86	11.302	128	25.48	58
Oct. 6.5	17.372	91	66.27	14	40.616	135	71.97	266	22.414	80	22.63	113	11.430	98	26.06	37
16.5	17.463	60	66.41	6	40.751	87	74.63	253	22.494	47	23.76	132	11.528	65	26.43	15
26.5	17.523	30	66.35	24	40.838	40	77.16	238	22.541	14	25.08	146	11.593	37	26.58	2
Nov. 5.4	17.553	3	66.11	39	40.878	7	79.54	216	22.555	16	26.54	152	11.630	8	26.56	18
15.4	17.556	24	65.72	51	40.871	51	81.70	190	22.539	43	28.06	153	11.638	19	26.38	32
25.4	17.532	47	65.21	60	40.820	94	83.60	158	22.496	69	29.59	147	11.619	43	26.06	42
Dec. 5.4	17.485	70	64.61	66	40.726	137	85.18	123	22.427	90	31.06	134	11.576	68	25.64	52
15.3	17.415	90	63.95	71	40.589	173	86.41	83	22.337	112	32.40	117	11.508	88	25.12	60
25.3	17.325	107	63.24	71	40.416	204	87.24	40	22.225	126	33.57	98	11.420	106	24.52	64
35.3	17.218		62.53		40.212		87.64		22.099		34.55		11.314		23.88	
Mean Place	12.857		41.50		34.455		52.51		18.268		48.80		6.847		1.80	
Sec δ, Tan δ	1.004		+0.089		1.565		+1.204		1.042		−0.294		1.012		+0.154	
Dψα, Dωα	+0.06		−0.01		+0.07		−0.07		+0.06		+0.02		+0.06		−0.01	
Dψδ, Dωδ	+0.4		+0.4		+0.4		+0.4		+0.4		+0.4		+0.4		+0.4	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Sculptoris. Mag. 5.4				ζ Ceti. Mag. 3.9				α Trianguli. Mag. 3.6				ε Cassiopeiæ. Mag. 3.4			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	1 41		−25 26		1 47		−10 43		1 48		+29 11		1 48		+63 16	
	s		″		s		″		s		″		s		″	
Jan. 0.3	52.176	146	89.74	87	29.090	120	65.18	87	29.321	132	18.06	29	35.85	34	40.01	58
10.3	52.030	156	90.61	53	28.970	132	66.05	66	29.189	149	17.77	52	35.51	37	40.59	4
20.2	51.874	160	91.14	18	28.838	139	66.71	47	29.040	158	17.25	76	35.14	39	40.63	49
30.2	51.714	160	91.32	17	28.699	140	67.18	24	28.882	161	16.49	94	34.75	38	40.14	101
Feb. 9.2	51.554	151	91.15	52	28.559	134	67.42	1	28.721	154	15.55	112	34.37	36	39.13	148
19.2	51.403	135	90.63	87	28.425	120	67.43	24	28.567	139	14.43	123	34.01	32	37.65	188
Mar. 1.1	51.268	111	89.76	120	28.305	101	67.19	48	28.428	113	13.20	129	33.69	26	35.77	222
11.1	51.157	82	88.56	153	28.204	73	66.71	75	28.315	79	11.91	128	33.43	19	33.55	246
21.1	51.075	47	87.03	179	28.131	39	65.96	98	28.236	39	10.63	122	33.24	11	31.09	259
31.1	51.028	5	85.24	205	28.092	1	64.98	125	28.197	7	9.41	110	33.13	2	28.50	261
Apr. 10.0	51.023	40	83.19	226	28.091	42	63.73	146	28.204	58	8.31	91	33.11	7	25.89	253
20.0	51.063	84	80.93	245	28.133	86	62.27	169	28.262	109	7.40	67	33.18	17	23.36	236
30.0	51.147	133	78.48	258	28.219	130	60.58	187	28.371	159	6.73	41	33.35	27	21.00	210
May 9.9	51.280	177	75.90	266	28.349	172	58.71	202	28.530	207	6.32	9	33.62	35	18.90	176
19.9	51.457	218	73.24	266	28.521	211	56.69	214	28.737	249	6.23	21	33.97	42	17.14	137
29.9	51.675	254	70.58	262	28.732	244	54.55	219	28.986	284	6.44	52	34.39	48	15.77	94
June 8.9	51.929	281	67.96	250	28.976	270	52.36	219	29.270	313	6.96	82	34.87	54	14.83	47
18.8	52.210	305	65.46	233	29.246	291	50.17	214	29.583	332	7.78	111	35.41	57	14.36	0
28.8	52.515	317	63.13	209	29.537	304	48.03	203	29.915	344	8.89	134	35.98	59	14.36	47
July 8.8	52.832	321	61.04	179	29.841	307	46.00	187	30.259	346	10.23	157	36.57	59	14.83	93
18.8	53.153	319	59.25	145	30.148	302	44.13	164	30.605	340	11.80	172	37.16	59	15.76	136
28.7	53.472	307	57.80	106	30.450	293	42.49	139	30.945	328	13.52	184	37.75	57	17.12	176
Aug. 7.7	53.779	289	56.74	64	30.743	276	41.10	108	31.273	307	15.36	192	38.32	54	18.88	212
17.7	54.068	263	56.10	22	31.019	252	40.02	75	31.580	283	17.28	194	38.86	49	21.00	242
27.6	54.331	235	55.88	22	31.271	226	39.27	42	31.863	253	19.22	194	39.35	45	23.42	268
Sept. 6.6	54.566	199	56.10	64	31.497	195	38.85	7	32.116	222	21.16	188	39.80	39	26.10	287
16.6	54.765	163	56.74	102	31.692	162	38.78	25	32.338	189	23.04	180	40.19	32	28.97	303
26.6	54.928	125	57.76	134	31.854	128	39.03	54	32.527	153	24.84	167	40.51	26	32.00	310
Oct. 6.5	55.053	87	59.10	162	31.982	97	39.57	82	32.680	118	26.51	155	40.77	20	35.10	313
16.5	55.140	51	60.72	180	32.079	63	40.39	102	32.798	85	28.06	139	40.97	13	38.23	307
26.5	55.191	15	62.52	194	32.142	32	41.41	119	32.883	52	29.45	119	41.10	6	41.30	296
Nov. 5.5	55.206	18	64.46	196	32.174	4	42.60	128	32.935	18	30.64	101	41.16	1	44.26	279
15.4	55.188	49	66.42	193	32.178	26	43.88	133	32.953	13	31.65	82	41.15	8	47.05	253
25.4	55.139	77	68.35	180	32.152	50	45.21	130	32.940	44	32.47	59	41.07	16	49.58	221
Dec. 5.4	55.062	100	70.15	161	32.102	75	46.51	125	32.896	73	33.06	36	40.91	21	51.79	183
15.3	54.962	124	71.76	137	32.027	94	47.76	112	32.823	99	33.42	10	40.70	27	53.62	138
25.3	54.838	139	73.13	108	31.933	114	48.88	99	32.724	125	33.52	14	40.43	32	55.00	90
35.3	54.699		74.21		31.819		49.87		32.599		33.38		40.11		55.90	
Mean Place	50.899		84.73		27.704		64.71		27.574		5.34		33.062		18.86	
Sec δ, Tan δ	1.108		−0.476		1.018		−0.190		1.145		+0.559		2.224		+1.986	
$D_\psi a$, $D_\omega a$	+0.06		+0.03		+0.06		+0.01		+0.07		−0.03		+0.08		−0.12	
$D_\psi \delta$, $D_\omega \delta$	+0.4		+0.4		+0.4		+0.5		+0.4		+0.5		+0.4		+0.5	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Hydri. Mag. 3.0 Right Ascension.		α Hydri. Declination.		50 Cassiopeiæ. Mag. 4.1 Right Ascension.		50 Cassiopeiæ. Declination.		γ Andromedæ pr. Mag. 2.3 Right Ascension.		γ Andromedæ pr. Declination.		α Arietis. Mag. 2.2 Right Ascension.		α Arietis. Declination.	
	h m 1 56		° ′ −61 57		h m 1 56		° ′ +72 1		h m 1 58		° ′ +41 56		h m 2 2		° ′ +23 4	
	s		″		s		″		s		″		s		″	
Jan. 0.3	13.87	40	62.58	72	32.99	53	70.61	90	57.268	165	46.09	11	37.944	118	58.44	34
10.3	13.47	41	63.30	13	32.46	57	71.51	34	57.103	186	46.20	26	37.826	136	58.10	52
20.3	13.06	41	63.43	46	31.89	60	71.85	25	56.917	200	45.94	61	37.690	148	57.58	68
30.2	12.65	40	62.97	101	31.29	60	71.60	83	56.717	203	45.33	94	37.542	153	56.90	81
Feb. 9.2	12.25	38	61.96	155	30.69	56	70.77	137	56.514	197	44.39	124	37.389	150	56.09	92
19.2	11.87	35	60.41	203	30.13	51	69.40	185	56.317	180	43.15	148	37.239	138	55.17	98
Mar. 1.1	11.52	31	58.38	246	29.62	42	67.55	225	56.137	150	41.67	166	37.101	115	54.19	100
11.1	11.21	25	55.92	283	29.20	33	65.30	256	55.987	111	40.01	176	36.986	87	53.19	97
21.1	10.96	18	53.09	315	28.87	21	62.74	275	55.876	63	38.25	179	36.899	50	52.22	88
31.1	10.78	12	49.94	337	28.66	7	59.99	284	55.813	9	36.46	174	36.849	6	51.34	74
Apr. 10.0	10.66	4	46.57	355	28.59	7	57.15	282	55.804	51	34.72	160	36.843	40	50.60	57
20.0	10.62	5	43.02	362	28.66	19	54.33	269	55.855	110	33.12	141	36.883	90	50.03	34
30.0	10.67	12	39.40	362	28.85	33	51.64	246	55.965	168	31.71	113	36.973	139	49.69	10
May 10.0	10.79	20	35.78	354	29.18	46	49.18	214	56.133	224	30.58	83	37.112	185	49.59	18
19.9	10.99	28	32.24	338	29.64	56	47.04	177	56.357	274	29.75	51	37.297	227	49.77	45
29.9	11.27	34	28.86	315	30.20	65	45.27	133	56.631	316	29.24	13	37.524	263	50.22	72
June 8.9	11.61	40	25.71	283	30.85	73	43.94	87	56.947	351	29.11	24	37.787	291	50.94	97
18.8	12.01	45	22.88	244	31.58	79	43.07	37	57.298	374	29.35	59	38.078	315	51.91	121
28.8	12.46	48	20.44	198	32.37	81	42.70	13	57.672	388	29.94	93	38.393	326	53.12	139
July 8.8	12.94	51	18.46	148	33.18	83	42.83	63	58.060	394	30.87	125	38.719	331	54.51	155
18.8	13.45	52	16.98	92	34.01	82	43.46	110	58.454	389	32.12	153	39.050	329	56.06	167
28.7	13.97	51	16.06	34	34.83	80	44.56	156	58.843	378	33.65	177	39.379	319	57.73	172
Aug. 7.7	14.48	49	15.72	24	35.63	76	46.12	197	59.221	356	35.42	195	39.698	301	59.45	175
17.7	14.97	45	15.96	84	36.39	71	48.09	233	59.577	332	37.37	212	39.999	280	61.20	173
27.7	15.42	41	16.80	140	37.10	64	50.42	266	59.909	299	39.49	221	40.279	254	62.93	166
Sept. 6.6	15.83	34	18.20	190	37.74	56	53.08	292	60.208	265	41.70	228	40.533	224	64.59	157
16.6	16.17	28	20.10	235	38.30	49	56.00	313	60.473	228	43.98	228	40.757	195	66.16	145
26.6	16.45	21	22.45	272	38.79	38	59.13	327	60.701	191	46.26	225	40.952	161	67.61	132
Oct. 6.5	16.66	11	25.17	298	39.17	30	62.40	334	60.892	149	48.51	219	41.113	129	68.93	115
16.5	16.77	5	28.15	312	39.47	20	65.74	336	61.041	110	50.70	207	41.242	98	70.08	99
26.5	16.82	4	31.27	315	39.67	7	69.10	329	61.151	69	52.77	194	41.340	65	71.07	83
Nov. 5.5	16.78	11	34.42	305	39.74	2	72.39	313	61.220	30	54.71	175	41.405	34	71.90	64
15.4	16.67	19	37.47	285	39.72	13	75.52	291	61.250	10	56.46	153	41.439	3	72.54	48
25.4	16.48	25	40.32	252	39.59	23	78.43	261	61.240	48	57.99	127	41.442	27	73.02	29
Dec. 5.4	16.23	30	42.84	211	39.36	33	81.04	222	61.192	87	59.26	99	41.415	55	73.31	12
15.4	15.93	35	44.95	162	39.03	43	83.26	176	61.105	121	60.25	66	41.360	84	73.43	7
25.3	15.58	38	46.57	107	38.60	50	85.02	124	60.984	153	60.91	31	41.276	107	73.36	25
35.3	15.20		47.64		38.10		86.26		60.831		61.22		41.169		73.11	
Mean Place	12.608		49.28		29.160		48.57		55.208		30.18		36.182		48.20	
Sec δ, Tan δ	2.127		−1.878		3.242		+3.084		1.344		+0.899		1.087		+0.426	
$D_\psi a$, $D_\omega a$	+0.04		+0.11		+0.10		−0.18		+0.07		−0.05		+0.07		−0.02	
$D_\psi \delta$, $D_\omega \delta$	+0.3		+0.5		+0.3		+0.5		+0.3		+0.5		+0.3		+0.5	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Trianguli. Mag. 3.1				55 Cassiopeiæ. Mag. 6.2				6 Persei. Mag. 5.4				ξ¹ Ceti. Mag. 4.5			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	2 4		+34 36		2 8		+66 8		2 8		+50 41		2 8		+ 8 28	
	s		″		s		″		s		″		s		″	
Jan. 0.3	45.043		30.81		9.62		64.78		14.907		42.46		43.905		7.32	
10.3	44.905	138	30.77	4	9.25	37	65.66	88	14.705	202	42.90	44	43.799	106	6.67	65
20.3	44.745	160	30.44	33	8.84	41	66.01	35	14.477	228	42.90	0	43.675	124	6.01	66
30.2	44.572	173	29.82	62	8.41	43	65.81	20	14.230	247	42.47	43	43.540	135	5.36	65
Feb. 9.2	44.393	179	28.95	87	7.97	44	65.07	74	13.978	252	41.62	85	43.399	141	4.74	62
19.2	44.218	175	27.85	110	7.54	43	63.82	125	13.731	247	40.39	123	43.259	140	4.17	57
Mar. 1.1	44.058	160	26.57	128	7.15	39	62.11	171	13.506	225	38.83	156	43.129	130	3.67	50
11.1	43.922	136	25.18	139	6.82	33	60.02	209	13.312	194	37.02	181	43.018	111	3.27	40
21.1	43.820	102	23.72	146	6.56	26	57.65	237	13.164	148	35.01	201	42.933	85	3.02	25
31.1	43.760	60	22.28	144	6.39	17	55.08	257	13.072	92	32.90	211	42.879	54	2.92	10
Apr. 10.0	43.748	12	20.91	137	6.32	7	52.42	266	13.042	30	30.80	210	42.865	14	3.00	8
20.0	43.789	41	19.70	121	6.35	3	49.78	264	13.081	39	28.77	203	42.895	30	3.31	31
30.0	43.886	97	18.69	101	6.49	14	47.27	251	13.190	109	26.89	188	42.969	74	3.83	52
May 10.0	44.036	150	17.93	76	6.73	24	44.97	230	13.366	176	25.26	163	43.089	120	4.59	76
19.9	44.237	201	17.45	48	7.07	34	42.96	201	13.610	244	23.92	134	43.253	164	5.57	98
29.9	44.485	248	17.29	16	7.51	44	41.30	166	13.911	301	22.94	98	43.457	204	6.76	119
June 8.9	44.772	287	17.46	17	8.02	51	40.06	124	14.263	352	22.33	61	43.695	238	8.13	137
18.8	45.092	320	17.94	48	8.58	56	39.26	80	14.655	392	22.11	22	43.963	268	9.66	153
28.8	45.434	342	18.74	80	9.19	61	38.92	34	15.077	422	22.30	19	44.252	289	11.31	165
July 8.8	45.792	358	19.82	108	9.83	64	39.06	14	15.520	443	22.87	57	44.556	304	13.02	171
18.8	46.155	363	21.15	133	10.48	65	39.66	60	15.969	449	23.83	96	44.865	309	14.75	173
28.7	46.515	360	22.71	156	11.14	66	40.71	105	16.416	447	25.14	131	45.173	308	16.44	169
Aug. 7.7	46.864	349	24.43	172	11.78	64	42.18	147	16.852	436	26.77	163	45.472	299	18.05	161
17.7	47.196	332	26.29	186	12.39	61	44.03	185	17.268	416	28.65	188	45.758	286	19.55	150
27.7	47.504	308	28.23	194	12.96	57	46.23	220	17.655	387	30.78	213	46.023	265	20.90	135
Sept. 6.6	47.785	281	30.22	199	13.49	53	48.72	249	18.010	355	33.08	230	46.264	241	22.05	115
16.6	48.035	250	32.21	199	13.96	47	51.45	273	18.326	316	35.51	243	46.478	214	23.00	95
26.6	48.250	215	34.17	196	14.35	39	54.38	293	18.601	275	38.03	252	46.663	185	23.72	72
Oct. 6.5	48.432	182	36.06	189	14.69	34	57.44	306	18.832	231	40.59	256	46.817	154	24.23	51
16.5	48.577	145	37.85	179	14.96	27	60.56	312	19.017	185	43.14	255	46.941	124	24.51	28
26.5	48.687	110	39.51	166	15.15	19	63.69	313	19.155	138	45.62	248	47.035	94	24.60	9
Nov. 5.5	48.760	73	41.02	151	15.26	11	66.75	306	19.245	90	48.00	238	47.099	64	24.51	9
15.4	48.798	38	42.36	134	15.29	3	69.69	294	19.287	42	50.22	222	47.133	34	24.27	24
25.4	48.801	3	43.49	113	15.23	6	72.42	273	19.280	7	52.21	199	47.140	7	23.90	37
Dec. 5.4	48.769	32	44.41	92	15.10	13	74.85	243	19.226	54	53.94	173	47.118	22	23.43	47
15.4	48.703	66	45.07	66	14.89	21	76.94	209	19.124	102	55.38	144	47.070	48	22.89	54
25.3	48.605	98	45.48	41	14.61	28	78.61	167	18.979	145	56.45	107	46.996	74	22.29	60
35.3	48.478	127	45.60	12	14.27	34	79.80	119	18.795	184	57.12	67	46.900	96	21.65	64
Mean Place	43.090		17.20		6.296		44.26		12.506		24.91		42.264		2.00	
Sec δ, Tan δ	1.215		+0.690		2.473		+2.262		1.579		+1.222		1.011		+0.149	
$D_\psi\alpha$, $D_\omega\alpha$	+0.07		−0.04		+0.09		−0.13		+0.08		−0.07		+0.06		−0.01	
$D_\psi\delta$, $D_\omega\delta$	+0.3		+0.5		+0.3		+0.5		+0.3		+0.5		+0.3		+0.5	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Fornacis. Mag. 5.2 Right Ascension.		μ Fornacis. Declination.		γ Trianguli. Mag. 4.1 Right Ascension.		γ Trianguli. Declination.		67 Ceti. Mag. 5.7 Right Ascension.		67 Ceti. Declination.		φ Eridani. Mag. 3.8 Right Ascension.		φ Eridani. Declination.	
	h m 2 9		° ′ −31 5		h m 2 12		° ′ +33 28		h m 2 12		° ′ − 6 47		h m 2 13		° ′ −51 52	
	s		″		s		″		s		″		s		″	
Jan. 0.3	21.591		80.17		31.597		36.61		58.062		41.49		38.235		84.15	
10.3	21.432	159	81.25	108	31.466	131	36.59	2	57.951	111	42.41	92	37.966	269	85.20	105
20.3	21.259	173	81.95	70	31.312	154	36.29	30	57.824	127	43.16	75	37.679	287	85.75	55
30.2	21.077	182	82.25	30	31.141	171	35.73	56	57.685	139	43.75	59	37.382	297	85.73	2
Feb. 9.2	20.890	187	82.13	12	30.964	177	34.91	82	57.541	144	44.16	41	37.085	297	85.18	55
19.2	20.708	182	81.61	52	30.789	175	33.89	102	57.397	144	44.35	19	36.798	287	84.11	107
Mar. 1.2	20.540	168	80.71	90	30.627	162	32.69	120	57.262	135	44.33	2	36.531	267	82.56	155
11.1	20.391	149	79.42	120	30.486	141	31.37	132	57.145	117	44.08	25	36.291	240	80.55	201
21.1	20.272	119	77.79	163	30.378	108	30.00	137	57.052	93	43.60	48	36.091	200	78.16	239
31.1	20.187	85	75.84	195	30.311	67	28.63	137	56.991	61	42.88	72	35.938	153	75.42	274
Apr. 10.0	20.144	43	73.60	224	30.291	20	27.33	130	56.968	23	41.93	95	35.838	100	72.40	302
20.0	20.146	2	71.12	248	30.322	31	26.18	115	56.986	18	40.73	120	35.799	39	69.17	323
30.0	20.197	51	68.46	266	30.408	86	25.20	98	57.049	63	39.31	142	35.822	23	65.80	337
May 10.0	20.297	100	65.66	280	30.548	140	24.48	72	57.156	107	37.69	162	35.909	87	62.35	345
19.9	20.446	149	62.79	287	30.739	191	24.03	45	57.307	151	35.90	179	36.060	151	58.91	344
29.9	20.640	194	59.90	289	30.977	238	23.88	15	57.497	190	33.98	192	36.271	211	55.55	336
June 8.9	20.873	233	57.08	282	31.255	278	24.05	17	57.724	227	31.96	202	36.537	266	52.35	320
18.9	21.143	270	54.38	270	31.566	311	24.51	46	57.981	257	29.89	207	36.852	315	49.41	294
28.8	21.439	296	51.88	250	31.902	336	25.29	78	58.260	279	27.83	206	37.207	355	46.78	263
July 8.8	21.754	315	49.65	223	32.255	353	26.33	104	58.554	294	25.84	199	37.593	386	44.54	224
18.8	22.080	326	47.73	192	32.613	358	27.61	128	58.857	303	23.97	187	37.998	405	42.75	179
28.7	22.409	329	46.21	152	32.970	357	29.11	150	59.159	302	22.28	169	38.412	414	41.46	129
Aug. 7.7	22.733	324	45.10	111	33.317	347	30.78	167	59.455	296	20.80	148	38.824	412	40.71	75
17.7	23.041	308	44.46	64	33.649	332	32.56	178	59.738	283	19.60	120	39.220	396	40.54	17
27.7	23.330	289	44.30	16	33.958	309	34.43	187	60.002	264	18.68	92	39.593	373	40.93	39
Sept. 6.6	23.591	261	44.61	31	34.242	284	36.33	190	60.243	241	18.09	59	39.932	339	41.90	97
16.6	23.821	230	45.38	77	34.496	254	38.23	190	60.456	213	17.82	27	40.229	297	43.39	149
26.6	24.015	194	46.58	120	34.717	221	40.10	187	60.641	185	17.86	4	40.477	248	45.36	197
Oct. 6.6	24.171	156	48.16	158	34.905	188	41.90	180	60.794	153	18.21	35	40.670	193	47.72	236
16.5	24.288	117	50.05	189	35.057	152	43.60	170	60.915	121	18.83	62	40.805	135	50.40	268
26.5	24.366	78	52.17	212	35.174	117	45.17	157	61.007	92	19.67	84	40.883	78	53.30	290
Nov. 5.5	24.405	39	54.43	226	35.256	82	46.60	143	61.067	60	20.68	101	40.903	20	56.29	299
15.4	24.408	3	56.75	232	35.304	48	47.87	127	61.096	29	21.83	115	40.865	38	59.28	299
25.4	24.373	35	59.02	227	35.315	11	48.94	107	61.098	2	23.04	121	40.773	92	62.14	286
Dec. 5.4	24.306	67	61.15	213	35.292	23	49.81	87	61.071	27	24.27	123	40.632	141	64.75	261
15.4	24.209	97	63.09	194	35.235	57	50.44	63	61.018	53	25.46	119	40.447	185	67.02	227
25.3	24.085	124	64.75	166	35.146	89	50.84	40	60.939	79	26.58	112	40.223	224	68.90	188
35.3	23.937	148	66.08	133	35.026	120	50.97	13	60.837	102	27.60	102	39.969	254	70.30	140
Mean Place	20.182		73.21		29.609		23.70		56.515		41.72		36.838		72.46	
Sec δ, Tan δ	1.168		−0.603		1.199		+0.661		1.007		−0.119		1.620		−1.275	
$D_\psi\alpha$, $D_\omega\alpha$	+0.05		+0.03		+0.07		−0.04		+0.06		+0.01		+0.04		+0.07	
$D_\psi\delta$, $D_\omega\delta$	+0.3		+0.5		+0.3		+0.5		+0.3		+0.5		+0.3		+0.6	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ² Ceti. Mag. 4.3 Right Ascension.		ξ² Ceti. Mag. 4.3 Declination.		σ Ceti. Mag. 4.8 Right Ascension.		σ Ceti. Mag. 4.8 Declination.	
	h m 2 23		° ′ + 8 5		h m 2 28		° ′ −15 35	
	s		″		s		″	
Jan. 0.3	52.713	101	56.32	65	16.374	118	60.47	111
10.3	52.612	122	55.67	65	16.256	135	61.58	86
20.3	52.490	135	55.02	64	16.121	150	62.44	59
30.2	52.355	145	54.38	60	15.971	158	63.03	31
Feb. 9.2	52.210	145	53.78	55	15.813	158	63.34	3
19.2	52.065	138	53.23	47	15.655	152	63.37	27
Mar. 1.2	51.927	122	52.76	37	15.503	137	63.10	57
11.1	51.805	98	52.39	23	15.366	112	62.53	85
21.1	51.707	66	52.16	9	15.254	82	61.68	113
31.1	51.641	28	52.07	10	15.172	46	60.55	139
Apr. 10.1	51.613	15	52.17	31	15.126	4	59.16	165
20.0	51.628	59	52.48	51	15.122	42	57.51	186
30.0	51.687	106	52.99	75	15.164	88	55.65	207
May 10.0	51.793	150	53.74	96	15.252	131	53.58	220
19.9	51.943	192	54.70	116	15.383	174	51.38	230
29.9	52.135	227	55.86	134	15.557	213	49.08	235
June 8.9	52.362	259	57.20	149	15.770	246	46.73	234
18.9	52.621	282	58.69	161	16.016	271	44.39	228
28.8	52.903	297	60.30	166	16.287	290	42.11	214
July 8.8	53.200	308	61.96	169	16.577	301	39.97	195
18.8	53.508	308	63.65	164	16.878	306	38.02	170
28.8	53.816	301	65.29	158	17.184	301	36.32	141
Aug. 7.7	54.117	290	66.87	146	17.485	290	34.91	107
17.7	54.407	272	68.33	129	17.775	275	33.84	69
27.7	54.679	250	69.62	110	18.050	252	33.15	31
Sept. 6.6	54.929	226	70.72	90	18.302	227	32.84	8
16.6	55.155	197	71.62	66	18.529	197	32.92	46
26.6	55.352	169	72.28	46	18.726	167	33.38	80
Oct. 6.6	55.521	140	72.74	22	18.893	135	34.18	112
16.5	55.661	108	72.96	4	19.028	102	35.30	136
26.5	55.769	79	73.00	14	19.130	70	36.66	154
Nov. 5.5	55.848	51	72.86	30	19.200	38	38.20	167
15.5	55.899	20	72.56	40	19.238	7	39.87	170
25.4	55.919	9	72.16	51	19.245	25	41.57	169
Dec. 5.4	55.910	37	71.65	57	19.220	53	43.26	158
15.4	55.873	66	71.08	62	19.167	80	44.84	145
25.3	55.807	89	70.46	65	19.087	105	46.29	125
35.3	55.718		69.81		18.982		47.54	
Mean Place	50.991		51.63		14.799		57.66	
Sec δ, Tan δ	1.010		+0.142		1.038		−0.279	
$D_{\psi}a$, $D_{\omega}a$	+0.06		−0.01		+0.06		+0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.3		+0.6		+0.3		+0.6	

Washington Mean Time.	36 H. Cassiopeiæ. Mag. 5.3 Right Ascension.		36 H. Cassiopeiæ. Mag. 5.3 Declination.		ν Ceti. Mag. 5.0 Right Ascension.		ν Ceti. Mag. 5.0 Declination.	
	h m 2 30		° ′ +72 27		h m 2 31		° ′ + 5 14	
	s		″		s		″	
Jan. 0.3	22.55	50	74.46	130	38.995	98	29.47	72
10.3	22.05	56	75.76	78	38.897	120	28.75	68
20.3	21.49	60	76.54	20	38.777	135	28.07	64
30.2	20.89	62	76.74	38	38.642	145	27.43	57
Feb. 9.2	20.27	62	76.36	96	38.497	147	26.86	48
19.2	19.65	57	75.40	146	38.350	142	26.38	38
Mar. 1.2	19.08	51	73.94	191	38.208	126	26.00	25
11.1	18.57	42	72.03	230	38.082	104	25.75	11
21.1	18.15	31	69.73	257	37.978	73	25.64	6
31.1	17.84	17	67.16	274	37.905	36	25.70	26
Apr. 10.1	17.67	4	64.42	280	37.869	6	25.96	46
20.0	17.63	10	61.62	276	37.875	50	26.42	68
30.0	17.73	24	58.86	261	37.925	96	27.10	88
May 10.0	17.97	37	56.25	239	38.021	140	27.98	110
19.9	18.34	50	53.86	206	38.161	182	29.08	129
29.9	18.84	59	51.80	170	38.343	219	30.37	145
June 8.9	19.43	70	50.10	127	38.562	251	31.82	158
18.9	20.13	76	48.83	82	38.813	275	33.40	168
28.8	20.89	82	48.01	34	39.088	293	35.08	171
July 8.8	21.71	84	47.67	13	39.381	302	36.79	171
18.8	22.55	86	47.80	61	39.683	305	38.50	164
28.8	23.41	85	48.41	107	39.988	301	40.14	154
Aug. 7.7	24.26	83	49.48	150	40.289	290	41.68	140
17.7	25.09	79	50.98	189	40.579	274	43.08	121
27.7	25.88	73	52.87	225	40.853	252	44.29	100
Sept. 6.6	26.61	67	55.12	257	41.105	229	45.29	75
16.6	27.28	59	57.69	281	41.334	201	46.04	53
26.6	27.87	50	60.50	303	41.535	174	46.57	27
Oct. 6.6	28.37	42	63.53	316	41.709	145	46.84	6
16.5	28.79	32	66.69	324	41.854	115	46.90	17
26.5	29.11	19	69.93	325	41.969	86	46.73	33
Nov. 5.5	29.30	10	73.18	318	42.055	55	46.40	48
15.5	29.40	2	76.36	302	42.110	25	45.92	59
25.4	29.38	13	79.38	280	42.135	2	45.33	68
Dec. 5.4	29.25	26	82.18	248	42.133	33	44.65	73
15.4	28.99	36	84.66	210	42.100	61	43.92	73
25.3	28.63	45	86.76	162	42.039	85	43.19	74
35.3	28.18		88.38		41.954		42.45	
Mean Place	17.917		54.51		37.258		25.96	
Sec δ, Tan δ	3.320		+3.166		1.004		+0.092	
$D_{\psi}a$, $D_{\omega}a$	+0.11		−0.17		+0.06		−0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.3		+0.6		+0.3		+0.6	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Hydri. Mag. 5.3				ν Arietis. Mag. 5.4				δ Ceti. Mag. 4.0				ε Hydri. Mag. 4.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	2 33		−79 27		2 34		+21 36		2 35		− 0 0		2 38		−68 36	
	s		″		s		″		s		″		s		″	
Jan. 0.3	23.30	117	61.28	95	14.750	103	51.04	28	21.467	99	70.74	85	22.07	53	63.63	121
10.3	22.13	123	62.23	35	14.647	128	50.76	40	21.368	120	71.59	76	21.54	56	64.84	63
20.3	20.90	126	62.58	25	14.519	146	50.36	54	21.248	136	72.35	64	20.98	58	65.47	3
30.2	19.64	124	62.33	85	14.373	156	49.82	65	21.112	147	72.99	53	20.40	59	65.50	57
Feb. 9.2	18.40	121	61.48	142	14.217	160	49.17	75	20.965	149	73.52	39	19.81	58	64.93	113
19.2	17.19	114	60.06	192	14.057	154	48.42	81	20.816	144	73.91	22	19.23	54	63.80	166
Mar. 1.2	16.05	104	58.14	239	13.903	137	47.61	83	20.672	130	74.13	6	18.69	50	62.14	214
11.1	15.01	91	55.75	277	13.766	112	46.78	82	20.542	107	74.19	12	18.19	44	60.00	258
21.1	14.10	76	52.98	312	13.654	78	45.96	76	20.435	77	74.07	34	17.75	37	57.42	293
31.1	13.34	61	49.86	335	13.576	37	45.20	64	20.358	41	73.73	54	17.38	28	54.49	322
Apr. 10.1	12.73	43	46.51	355	13.539	6	44.56	50	20.317	1	73.19	76	17.10	19	51.27	346
20.0	12.30	22	42.96	365	13.545	56	44.06	30	20.316	44	72.43	98	16.91	9	47.81	359
30.0	12.08	4	39.31	366	13.601	106	43.76	10	20.360	90	71.45	119	16.82	1	44.22	365
May 10.0	12.04	16	35.65	360	13.707	153	43.66	15	20.450	134	70.26	139	16.83	11	40.57	364
19.9	12.20	35	32.05	345	13.860	197	43.81	38	20.584	176	68.87	155	16.94	22	36.93	353
29.9	12.55	53	28.60	324	14.057	236	44.19	63	20.760	213	67.32	169	17.16	31	33.40	335
June 8.9	13.08	71	25.36	292	14.293	271	44.82	85	20.973	245	65.63	179	17.47	40	30.05	308
18.9	13.79	85	22.44	254	14.564	296	45.67	106	21.218	269	63.84	183	17.87	47	26.97	273
28.8	14.64	98	19.90	209	14.860	314	46.73	124	21.487	288	62.01	184	18.34	54	24.24	231
July 8.8	15.62	107	17.81	159	15.174	323	47.97	138	21.775	299	60.17	178	18.88	58	21.93	183
18.8	16.69	114	16.22	104	15.497	327	49.35	147	22.074	302	58.39	167	19.46	62	20.10	129
28.8	17.83	118	15.18	43	15.824	321	50.82	153	22.376	298	56.72	153	20.08	63	18.81	71
Aug. 7.7	19.01	116	14.75	16	16.145	310	52.35	154	22.674	289	55.19	132	20.71	62	18.10	10
17.7	20.17	112	14.91	77	16.455	293	53.89	153	22.963	273	53.87	108	21.33	61	18.00	53
27.7	21.29	105	15.68	135	16.748	273	55.42	145	23.236	252	52.79	83	21.94	56	18.53	111
Sept. 6.6	22.34	92	17.03	192	17.021	247	56.87	137	23.488	230	51.96	55	22.50	50	19.64	169
16.6	23.26	77	18.95	239	17.268	220	58.24	125	23.718	202	51.41	27	23.00	43	21.33	220
26.6	24.03	61	21.34	278	17.488	191	59.49	111	23.920	174	51.14	0	23.43	34	23.53	263
Oct. 6.6	24.64	39	24.12	310	17.679	161	60.60	97	24.094	147	51.14	26	23.77	23	26.16	299
16.5	25.03	18	27.22	327	17.840	130	61.57	81	24.241	116	51.40	48	24.00	15	29.15	320
26.5	25.21	3	30.49	334	17.970	100	62.38	67	24.357	87	51.88	66	24.15	3	32.35	333
Nov. 5.5	25.18	26	33.83	328	18.070	67	63.05	53	24.444	56	52.54	80	24.18	7	35.68	331
15.5	24.92	47	37.11	308	18.137	35	63.58	38	24.500	26	53.34	90	24.11	18	38.99	317
25.4	24.45	68	40.19	279	18.172	4	63.96	23	24.526	3	54.24	95	23.93	27	42.16	291
Dec. 5.4	23.77	84	42.98	238	18.176	30	64.19	9	24.523	33	55.19	97	23.66	36	45.07	254
15.4	22.93	99	45.36	188	18.146	61	64.28	4	24.490	61	56.16	95	23.30	43	47.61	209
25.3	21.94	112	47.24	132	18.085	90	64.24	20	24.429	85	57.11	90	22.87	49	49.70	158
35.3	20.82		48.56		17.995		64.04		24.344		58.01		22.38		51.28	
Mean Place	21.032		46.74		12.813		42.61		19.754		72.51		20.292		49.84	
Sec δ, Tan δ	5.468		−5.376		1.076		+0.396		1.000		0.000		2.742		−2.553	
$D_\psi \alpha$, $D_\omega \alpha$	−0.03		+0.28		+0.07		−0.02		+0.06		0.00		+0.02		+0.13	
$D_\psi \delta$, $D_\omega \delta$	+0.3		+0.6		+0.3		+0.6		+0.3		+0.6		+0.3		+0.6	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Persei. Mag. 4.2 Right Ascension.		θ Persei. Declination.		γ Ceti seq. Mag. 3.7 Right Ascension.		γ Ceti seq. Declination.		π Ceti. Mag. 4.4 Right Ascension.		π Ceti. Declination.		μ Ceti. Mag. 4.4 Right Ascension.		μ Ceti. Declination.	
	h m 2 38		° ′ +48 53		h m 2 39		° ′ + 2 53		h m 2 40		° ′ −14 11		h m 2 40		° ′ + 9 46	
	s		″		s		″		s		″		s		″	
Jan. 0.3	42.148	170	27.79	64	7.844	96	45.01	78	17.620	111	66.47	114	35.462	94	27.29	60
10.3	41.978	205	28.43	26	7.748	119	44.23	72	17.509	132	67.61	92	35.368	118	26.69	62
20.3	41.773	231	28.69	15	7.629	135	43.51	65	17.377	148	68.53	65	35.250	135	26.07	61
30.3	41.542	245	28.54	55	7.494	146	42.86	55	17.229	159	69.18	40	35.115	147	25.46	59
Feb. 9.2	41.297	248	27.99	91	7.348	149	42.31	45	17.070	161	69.58	11	34.968	151	24.87	56
19.2	41.049	237	27.08	126	7.199	146	41.86	32	16.909	156	69.69	18	34.817	146	24.31	50
Mar. 1.2	40.812	213	25.82	154	7.053	132	41.54	16	16.753	143	69.51	46	34.671	133	23.81	42
11.1	40.599	173	24.28	175	6.921	109	41.38	2	16.610	121	69.05	75	34.538	110	23.39	30
21.1	40.426	126	22.53	189	6.812	80	41.36	18	16.489	92	68.30	102	34.428	79	23.09	16
31.1	40.300	69	20.64	195	6.732	45	41.54	37	16.397	55	67.28	129	34.349	43	22.93	1
Apr. 10.1	40.231	3	18.69	192	6.687	3	41.91	58	16.342	14	65.99	154	34.306	2	22.92	19
20.0	40.228	64	16.77	182	6.684	42	42.49	80	16.328	30	64.45	176	34.304	45	23.11	38
30.0	40.292	132	14.95	164	6.726	86	43.29	100	16.358	76	62.69	196	34.349	91	23.49	61
May 10.0	40.424	197	13.31	141	6.812	132	44.29	122	16.434	121	60.73	213	34.440	137	24.10	81
20.0	40.621	257	11.90	110	6.944	175	45.51	139	16.555	165	58.60	223	34.577	180	24.91	101
29.9	40.878	311	10.80	78	7.119	212	46.90	153	16.720	203	56.37	230	34.757	217	25.92	121
June 8.9	41.189	357	10.02	44	7.331	244	48.43	166	16.923	236	54.07	230	34.974	250	27.13	135
18.9	41.546	391	9.58	6	7.575	270	50.09	172	17.159	265	51.77	226	35.224	275	28.48	148
28.8	41.937	416	9.52	30	7.845	288	51.81	175	17.424	284	49.51	213	35.499	294	29.96	156
July 8.8	42.353	432	9.82	65	8.133	299	53.56	173	17.708	297	47.38	197	35.793	306	31.52	159
18.8	42.785	437	10.47	97	8.432	303	55.29	163	18.005	303	45.41	173	36.099	308	33.11	158
28.8	43.222	432	11.44	129	8.735	299	56.92	153	18.308	301	43.68	145	36.407	305	34.69	153
Aug. 7.7	43.654	420	12.73	155	9.034	291	58.45	135	18.609	293	42.23	112	36.712	296	36.22	142
17.7	44.074	400	14.28	178	9.325	275	59.80	114	18.902	278	41.11	76	37.008	281	37.64	128
27.7	44.474	373	16.06	196	9.600	255	60.94	91	19.180	257	40.35	38	37.289	261	38.92	110
Sept. 6.7	44.847	342	18.02	212	9.855	232	61.85	65	19.437	234	39.97	1	37.550	239	40.02	92
16.6	45.189	306	20.14	222	10.087	206	62.50	40	19.671	207	39.96	38	37.789	212	40.94	69
26.6	45.495	267	22.36	228	10.293	179	62.90	13	19.878	178	40.34	73	38.001	186	41.63	50
Oct. 6.6	45.762	227	24.64	231	10.472	151	63.03	10	20.056	147	41.07	103	38.187	156	42.13	28
16.5	45.989	183	26.95	229	10.623	120	62.93	32	20.203	115	42.10	130	38.343	128	42.41	9
26.5	46.172	137	29.24	222	10.743	91	62.61	49	20.318	83	43.40	148	38.471	98	42.50	6
Nov. 5.5	46.309	91	31.46	210	10.834	61	62.12	65	20.401	52	44.88	163	38.569	68	42.44	23
15.5	46.400	42	33.56	196	10.895	31	61.47	75	20.453	19	46.51	168	38.637	37	42.21	34
25.4	46.442	7	35.52	175	10.926	1	60.72	82	20.472	12	48.19	166	38.674	8	41.87	44
Dec. 5.4	46.435	57	37.27	150	10.927	26	59.90	85	20.460	42	49.85	159	38.682	24	41.43	51
15.4	46.378	105	38.77	120	10.901	57	59.05	84	20.418	71	51.44	146	38.658	53	40.92	56
25.4	46.273	150	39.97	86	10.844	84	58.21	82	20.347	98	52.90	129	38.605	82	40.36	59
35.3	46.123		40.83		10.760		57.39		20.249		54.19		38.523		39.77	
Mean Place	39.530		12.45		6.089		42.48		15.976		63.85		33.633		22.69	
Sec δ, Tan δ	1.521		+1.146		1.001		+0.051		1.032		−0.253		1.015		+0.172	
$D_\psi a$, $D_\omega a$	+0.08		−0.06		+0.06		0.00		+0.06		+0.01		+0.06		−0.01	
$D_\psi \delta$, $D_\omega \delta$	+0.3		+0.6		+0.3		+0.6		+0.3		+0.6		+0.3		+0.6	

FOR THE UPPER TRANSIT AT WASHINGTON.

[Was]hington [Mea]n Time.	η Persei. Mag. 3.9 Right Ascension.		η Persei. Declination.		41 Arietis. Mag. 3.7 Right Ascension.		41 Arietis. Declination.		β Fornacis. Mag. 4.5 Right Ascension.		β Fornacis. Declination.		σ Arietis. Mag. 5.5 Right Ascension.		σ Arietis. Declination.	
	h m 2 44		° ′ +55 33		h m 2 45		° ′ +26 55		h m 2 45		° ′ −32 44		h m 2 47		° ′ +14 44	
	s		″		s		″		s		″		s		″	
[Ja]n. 0.3	49.659	206	53.53	93	14.770	104	48.48	6	43.647	153	51.80	143	2.963	92	61.97	45
10.3	49.453	249	54.46	49	14.666	131	48.42	26	43.494	175	53.23	102	2.871	118	61.52	51
20.3	49.204	279	54.95	5	14.535	152	48.16	42	43.319	191	54.25	61	2.753	137	61.01	56
30.3	48.925	297	55.00	41	14.383	168	47.74	60	43.128	202	54.86	17	2.616	150	60.45	59
[Fe]b. 9.2	48.628	301	54.59	85	14.215	171	47.14	76	42.926	205	55.03	27	2.466	156	59.86	61
19.2	48.327	289	53.74	125	14.044	165	46.38	87	42.721	198	54.76	68	2.310	152	59.25	60
[Ma]r. 1.2	48.038	261	52.49	160	13.879	152	45.51	96	42.523	183	54.08	109	2.158	139	58.65	57
11.1	47.777	218	50.89	186	13.727	126	44.55	99	42.340	158	52.99	148	2.019	117	58.08	51
21.1	47.559	162	49.03	208	13.601	92	43.56	98	42.182	126	51.51	182	1.902	86	57.57	41
31.1	47.397	95	46.95	218	13.509	51	42.58	92	42.056	87	49.69	214	1.816	50	57.16	27
[Ap]r. 10.1	47.302	23	44.77	220	13.458	3	41.66	80	41.969	41	47.55	241	1.766	6	56.89	11
20.0	47.279	55	42.57	212	13.455	48	40.86	63	41.928	6	45.14	265	1.760	40	56.78	8
30.0	47.334	134	40.45	198	13.503	98	40.23	45	41.934	57	42.49	280	1.800	87	56.86	29
[Ma]y 10.0	47.468	209	38.47	176	13.601	148	39.78	20	41.991	107	39.69	292	1.887	134	57.15	50
20.0	47.677	278	36.71	148	13.749	196	39.58	3	42.098	156	36.77	297	2.021	178	57.65	72
29.9	47.955	343	35.23	113	13.945	236	39.61	29	42.254	201	33.80	294	2.199	218	58.37	91
[Ju]ne 8.9	48.298	395	34.10	78	14.181	274	39.90	54	42.455	241	30.86	284	2.417	251	59.28	111
18.9	48.693	437	33.32	38	14.455	301	40.44	78	42.696	273	28.02	266	2.668	277	60.39	126
28.8	49.130	469	32.94	1	14.756	321	41.22	98	42.969	299	25.36	243	2.945	297	61.65	137
[Ju]ly 8.8	49.599	488	32.93	40	15.077	333	42.20	118	43.268	317	22.93	212	3.242	310	63.02	146
18.8	50.087	495	33.33	77	15.410	338	43.38	131	43.585	327	20.81	174	3.552	314	64.48	149
28.8	50.582	491	34.10	113	15.748	334	44.69	142	43.912	328	19.07	131	3.866	311	65.97	148
[Au]g. 7.7	51.073	480	35.23	144	16.082	325	46.11	149	44.240	321	17.76	85	4.177	302	67.45	144
17.7	51.553	459	36.67	173	16.407	309	47.60	153	44.561	306	16.91	35	4.479	288	68.89	134
27.7	52.012	431	38.40	198	16.716	290	49.13	151	44.867	287	16.56	15	4.767	270	70.23	121
[Se]pt. 6.7	52.443	396	40.38	219	17.006	265	50.64	147	45.154	260	16.71	65	5.037	246	71.44	107
16.6	52.839	357	42.57	234	17.271	239	52.11	141	45.414	229	17.36	112	5.283	221	72.51	90
26.6	53.196	313	44.91	246	17.510	210	53.52	132	45.643	195	18.48	155	5.504	195	73.41	72
[Oc]t. 6.6	53.509	267	47.37	254	17.720	181	54.84	120	45.838	157	20.03	191	5.699	167	74.13	55
16.5	53.776	216	49.91	255	17.901	148	56.04	109	45.995	119	21.94	221	5.866	137	74.68	37
26.5	53.992	162	52.46	253	18.049	116	57.13	97	46.114	81	24.15	239	6.003	107	75.05	20
[No]v. 5.5	54.154	107	54.99	244	18.165	83	58.10	83	46.195	40	26.54	250	6.110	77	75.25	8
15.5	54.261	48	57.43	231	18.248	50	58.93	68	46.235	2	29.04	251	6.187	47	75.33	6
25.4	54.309	11	59.74	209	18.298	13	59.61	54	46.237	37	31.55	242	6.234	14	75.27	16
[De]c. 5.4	54.298	69	61.83	185	18.311	21	60.15	39	46.200	73	33.97	224	6.248	18	75.11	26
15.4	54.229	127	63.68	153	18.290	57	60.54	21	46.127	107	36.21	197	6.230	48	74.85	34
25.4	54.102	182	65.21	117	18.233	88	60.75	4	46.020	136	38.18	164	6.182	79	74.51	42
35.3	53.920		66.38		18.145		60.79		45.884		39.82		6.103		74.09	
[Mea]n Place	46.664		37.25		12.683		39.06		42.041		44.18		1.045		56.15	
[Sec δ], Tan δ	1.768		+1.458		1.122		+0.508		1.189		−0.643		1.034		+0.263	
$D_\omega\alpha$	+0.09		−0.07		+0.07		−0.03		+0.05		+0.03		+0.07		−0.01	
$D_\omega\delta$	+0.3		+0.7		+0.3		+0.7		+0.3		+0.7		+0.3		+0.7	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Eridani. Mag. 3.4				47 H. Cephei. Mag. 5.7				α Ceti. Mag. 2.8				τ^3 Eridani. Mag. 4.2			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	2 55		−40 37		2 55		+79 5		2 58		+ 3 46		2 58		−23 56	
	s		″		s		″		s		″		s		″	
Jan. 0.3	13.174	180	52.75	156	22.95	77	80.18	179	4.450	88	23.92	79	50.929	122	33.88	143
10.3	12.994	208	54.31	112	22.18	91	81.97	125	4.362	114	23.13	72	50.807	146	35.31	110
20.3	12.786	226	55.43	64	21.27	99	83.22	66	4.248	133	22.41	65	50.661	167	36.41	76
30.3	12.560	238	56.07	16	20.28	104	83.88	4	4.115	147	21.76	57	50.494	179	37.17	39
Feb. 9.2	12.322	240	56.23	— 33	19.24	104	83.92	— 55	3.968	155	21.19	46	50.315	184	37.56	4
19.2	12.082	235	55.90	80	18.20	100	83.37	113	3.813	154	20.73	34	50.131	182	37.60	— 35
Mar. 1.2	11.847	219	55.10	126	17.20	91	82.24	166	3.659	142	20.39	20	49.949	169	37.25	71
11.2	11.628	194	53.84	167	16.29	77	80.58	212	3.517	123	20.19	6	49.780	150	36.54	106
21.1	11.434	160	52.17	205	15.52	62	78.46	248	3.394	95	20.13	— 11	49.630	121	35.48	136
31.1	11.274	118	50.12	238	14.90	42	75.98	274	3.299	60	20.24	31	49.509	85	34.12	169
Apr. 10.1	11.156	70	47.74	268	14.48	22	73.24	290	3.239	20	20.55	50	49.424	44	32.43	196
20.0	11.086	18	45.06	290	14.26	0	70.34	294	3.219	— 25	21.05	72	49.380	— 2	30.47	219
30.0	11.068	— 37	42.16	307	14.26	22	67.40	288	3.244	70	21.77	91	49.382	49	28.28	240
May 10.0	11.105	92	39.09	317	14.48	43	64.52	272	3.314	115	22.68	112	49.431	97	25.88	254
20.0	11.197	145	35.92	320	14.91	65	61.80	247	3.429	158	23.80	129	49.528	143	23.34	262
29.9	11.342	195	32.72	315	15.56	81	59.33	215	3.587	199	25.09	144	49.671	185	20.72	266
June 8.9	11.537	240	29.57	301	16.37	97	57.18	177	3.786	231	26.53	156	49.856	223	18.06	262
18.9	11.777	278	26.56	282	17.34	111	55.41	133	4.017	260	28.09	165	50.079	256	15.44	252
28.9	12.055	310	23.74	253	18.45	120	54.08	88	4.277	279	29.74	168	50.335	279	12.92	235
July 8.8	12.365	331	21.21	218	19.65	127	53.20	38	4.556	294	31.42	165	50.614	298	10.57	210
18.8	12.696	345	19.03	176	20.92	132	52.82	— 10	4.850	301	33.07	159	50.912	308	8.47	182
28.8	13.041	351	17.27	130	22.24	133	52.92	58	5.151	300	34.66	149	51.220	309	6.65	145
Aug. 7.7	13.392	347	15.97	78	23.57	131	53.50	105	5.451	294	36.15	132	51.529	304	5.20	104
17.7	13.739	334	15.19	25	24.88	128	54.55	150	5.745	283	37.47	113	51.833	294	4.16	62
27.7	14.073	313	14.94	— 31	26.16	122	56.05	190	6.028	264	38.60	90	52.127	276	3.54	16
Sept. 6.7	14.386	287	15.25	85	27.38	113	57.95	229	6.292	245	39.50	65	52.403	253	3.38	— 30
16.6	14.673	253	16.10	135	28.51	101	60.24	262	6.537	221	40.15	40	52.656	228	3.68	74
26.6	14.926	216	17.45	182	29.52	90	62.86	288	6.758	196	40.55	14	52.884	197	4.42	115
Oct. 6.6	15.142	176	19.27	221	30.42	76	65.74	312	6.954	168	40.69	— 8	53.081	165	5.57	151
16.6	15.318	133	21.48	252	31.18	60	68.86	326	7.122	141	40.61	32	53.246	132	7.08	180
26.5	15.451	87	24.00	271	31.78	43	72.12	336	7.263	111	40.29	48	53.378	98	8.88	202
Nov. 5.5	15.538	41	26.71	282	32.21	25	75.48	336	7.374	81	39.81	63	53.476	62	10.90	217
15.5	15.579	— 3	29.53	282	32.46	5	78.84	328	7.455	51	39.18	75	53.538	26	13.07	220
25.4	15.576	45	32.35	271	32.51	— 14	82.12	311	7.506	19	38.43	80	53.564	— 8	15.27	217
Dec. 5.4	15.531	89	35.06	249	32.37	35	85.23	287	7.525	— 12	37.63	84	53.556	42	17.44	205
15.4	15.442	128	37.55	219	32.02	51	88.10	252	7.513	43	36.79	84	53.514	76	19.49	186
25.4	15.314	163	39.74	183	31.51	69	90.62	209	7.470	74	35.95	82	53.438	106	21.35	161
35.3	15.151		41.57		30.82		92.71		7.396		35.13		53.332		22.96	
Mean Place	11.518		43.35		15.335		61.49		2.590		21.74		49.235		28.34	
Sec δ, Tan δ	1.318		−0.858		5.290		+5.195		1.002		+0.066		1.094		−0.444	
$D_\psi\alpha$, $D_\omega\alpha$	+0.05		+0.04		+0.16		−0.25		+0.06		0.00		+0.05		+0.02	
$D_\psi\delta$, $D_\omega\delta$	+0.3		+0.7		+0.3		+0.7		+0.3		+0.7		+0.3		+0.7	

FOR THE UPPER TRANSIT AT .

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Persei. (Algol.) Var. 2.1–3.2				δ Arietis. Mag. 4.5			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′	
	3 2		+40 38		3 6		+19 25	
	s		″		s		″	
Jan. 0.4	56.031		52.30		61.730		22.91	
10.3	55.911	120	52.82	52	61.645	85	22.65	26
20.3	55.754	157	53.05	23	61.530	115	22.30	35
30.3	55.569	185	52.98	7	61.393	137	21.86	44
Feb. 9.2	55.364	205	52.59	39	61.238	155	21.33	53
19.2	55.150	214	51.90	69	61.073	165	20.74	59
Mar. 1.2	54.940	210	50.96	94	60.909	164	20.11	63
11.2	54.744	196	49.77	119	60.755	154	19.45	66
21.1	54.576	168	48.42	135	60.621	134	18.81	64
31.1	54.446	130	46.95	147	60.517	104	18.22	59
Apr. 10.1	54.364	82	45.43	152	60.450	67	17.71	51
20.1	54.335	29	43.94	149	60.426	24	17.33	38
30.0	54.364	29	42.53	141	60.448	22	17.12	21
May 10.0	54.455	91	41.28	125	60.520	72	17.08	4
20.0	54.603	148	40.22	106	60.639	119	17.25	17
29.9	54.806	203	39.42	80	60.804	165	17.62	37
June 8.9	55.060	254	38.87	55	61.012	208	18.21	59
18.9	55.357	297	38.63	24	61.255	243	19.00	79
28.9	55.689	332	38.67	4	61.528	273	19.95	95
July 8.8	56.048	359	39.02	35	61.823	295	21.07	112
18.8	56.423	375	39.65	63	62.135	312	22.30	123
28.8	56.808	385	40.54	89	62.453	318	23.60	130
Aug. 7.8	57.193	385	41.66	112	62.772	319	24.94	134
17.7	57.571	378	42.97	131	63.085	313	26.28	134
27.7	57.936	365	44.45	148	63.387	302	27.58	130
Sept. 6.7	58.280	344	46.07	162	63.673	286	28.81	123
16.6	58.602	322	47.77	170	63.939	266	29.92	111
26.6	58.895	293	49.53	176	64.183	244	30.92	100
Oct. 6.6	59.158	263	51.32	179	64.400	217	31.79	87
16.6	59.388	230	53.11	179	64.592	192	32.50	71
26.5	59.582	194	54.87	176	64.754	162	33.08	58
Nov. 5.5	59.739	157	56.57	170	64.888	134	33.52	44
15.5	59.855	116	58.18	161	64.989	101	33.84	32
25.5	59.930	75	59.67	149	65.058	69	34.03	19
Dec. 5.4	59.961	31	61.02	135	65.093	35	34.13	10
15.4	59.948	13	62.17	115	65.095	2	34.12	1
25.4	59.891	57	63.11	94	65.060	35	34.01	11
35.3	59.790	101	63.79	68	64.992	68	33.80	21
Mean Place	53.513		40.41		59.641		16.67	
Sec δ, Tan δ	1.318		+0.859		1.060		+0.353	
$D_\psi a$, $D_\omega a$	+0.08		−0.04		+0.07		−0.02	
$D_\psi\delta$, $D_\omega\delta$	+0.3		+0.7		+0.3		+0.7	

Washington Mean Time.	12 Eridani. Mag. 4.0				48 H. Cephei. Mag. 5.5			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′	
	3 8		−29 17		3 9		+77 26	
	s		″		s		″	
Jan. 0.4	39.479		87.83		66.48		37.75	
10.3	39.349	130	89.39	156	65.87	61	39.64	189
20.3	39.191	158	90.59	120	65.13	74	41.00	136
30.3	39.013	178	91.41	82	64.30	83	41.81	81
Feb. 9.2	38.819	194	91.81	40	63.42	88	42.04	23
19.2	38.618	201	91.81	0	62.52	90	41.66	38
Mar. 1.2	38.419	199	91.39	42	61.64	88	40.70	96
11.2	38.230	189	90.57	82	60.83	81	39.21	149
21.1	38.063	167	89.37	120	60.11	72	37.25	196
31.1	37.923	140	87.81	156	59.54	57	34.92	233
Apr. 10.1	37.820	103	85.94	187	59.12	42	32.29	263
20.1	37.758	62	83.76	218	58.88	24	29.48	281
30.0	37.744	14	81.35	241	58.83	5	26.60	288
May 10.0	37.778	34	78.72	263	58.97	14	23.74	286
20.0	37.862	84	75.96	276	59.30	33	21.01	273
29.9	37.994	132	73.11	285	59.81	51	18.50	251
June 8.9	38.171	177	70.25	286	60.48	67	16.28	222
18.9	38.390	219	67.43	282	61.30	82	14.40	188
28.9	38.643	253	64.75	268	62.24	94	12.94	146
July 8.8	38.922	279	62.27	248	63.27	103	11.92	102
18.8	39.223	301	60.05	222	64.38	111	11.37	55
28.8	39.536	313	58.16	189	65.53	115	11.28	9
Aug. 7.8	39.855	319	56.67	149	66.70	117	11.67	39
17.7	40.170	315	55.62	105	67.87	117	12.52	85
27.7	40.476	306	55.05	57	69.01	114	13.81	129
Sept. 6.7	40.766	290	54.97	8	70.11	110	15.52	171
16.6	41.034	268	55.37	40	71.14	103	17.60	208
26.6	41.276	242	56.26	89	72.09	95	20.01	241
Oct. 6.6	41.488	212	57.58	132	72.94	85	22.73	272
16.6	41.667	179	59.30	172	73.66	72	25.67	294
26.5	41.812	145	61.33	203	74.26	60	28.80	313
Nov. 5.5	41.919	107	63.58	225	74.72	46	32.04	324
15.5	41.988	69	65.99	241	75.00	28	35.31	327
25.5	42.019	31	68.44	245	75.13	13	38.54	323
Dec. 5.4	42.013	6	70.85	241	75.08	5	41.62	308
15.4	41.970	43	73.12	227	74.87	21	44.50	288
25.4	41.890	80	75.17	205	74.49	38	47.07	257
35.3	41.776	114	76.94	177	73.96	53	49.23	216
Mean Place	37.749		80.91		59.384		20.41	
Sec δ, Tan δ	1.147		−0.561		4.599		+4.489	
$D_\psi a$, $D_\omega a$	+0.05		+0.03		+0.15		−0.20	
$D_\psi\delta$, $D_\omega\delta$	+0.3		+0.7		+0.3		+0.7	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Eridani. Mag. 4.3 Right Ascension.	Diff.	Declination.	Diff.	ι Hydri. Mag. 5.5 Right Ascension.	Diff.	Declination.	Diff.	α Persei. Mag. 1.9 Right Ascension.	Diff.	Declination.	Diff.	o Tauri. Mag. 3.8 Right Ascension.	Diff.	Declination.	Diff.
	h m 3 16		° ′ −43 22		h m 3 17		° ′ −77 40		h m 3 18		° ′ +49 34		h m 3 20		° ′ + 8 44	
	s		″		s		″		s		″		s		″	
Jan. 0.4	43.338	175	53.70	178	59.91	93	79.15	164	34.850	138	39.05	97	29.131	76	43.63	64
10.3	43.163	207	55.48	134	58.98	101	80.79	110	34.712	185	40.02	63	29.055	104	42.99	62
20.3	42.956	231	56.82	85	57.97	107	81.89	47	34.527	222	40.65	25	28.951	130	42.37	59
30.3	42.725	248	57.67	35	56.90	110	82.36	10	34.305	247	40.90	13	28.821	149	41.78	55
Feb. 9.3	42.477	256	58.02	16	55.80	110	82.26	68	34.058	263	40.77	50	28.672	158	41.23	50
19.2	42.221	253	57.86	67	54.70	107	81.58	126	33.795	260	40.27	88	28.514	161	40.73	43
Mar. 1.2	41.968	240	57.19	113	53.63	101	80.32	174	33.535	246	39.39	120	28.353	154	40.30	35
11.2	41.728	218	56.06	157	52.62	93	78.58	220	33.289	217	38.19	146	28.199	138	39.95	23
21.1	41.510	187	54.49	199	51.69	83	76.38	263	33.072	174	36.73	168	28.061	111	39.72	12
31.1	41.323	145	52.50	233	50.86	69	73.75	295	32.898	122	35.05	181	27.950	78	39.60	3
Apr. 10.1	41.178	98	50.17	266	50.17	56	70.80	322	32.776	60	33.24	186	27.872	38	39.63	21
20.1	41.080	44	47.51	291	49.61	39	67.58	341	32.716	7	31.38	184	27.834	5	39.84	38
30.0	41.036	11	44.60	311	49.22	24	64.17	356	32.723	75	29.54	175	27.839	52	40.22	56
May 10.0	41.047	68	41.49	323	48.98	6	60.61	360	32.798	144	27.79	158	27.891	98	40.78	77
20.0	41.115	125	38.26	328	48.92	12	57.01	353	32.942	209	26.21	136	27.989	141	41.55	95
30.0	41.240	178	34.98	325	49.04	28	53.48	342	33.151	267	24.85	110	28.130	184	42.50	112
June 8.9	41.418	228	31.73	315	49.32	45	50.06	319	33.418	321	23.75	80	28.314	219	43.62	125
18.9	41.646	272	28.58	295	49.77	59	46.87	292	33.739	363	22.95	49	28.533	251	44.87	136
28.9	41.918	307	25.63	268	50.36	73	43.95	254	34.102	398	22.46	15	28.784	273	46.23	143
July 8.8	42.225	335	22.95	236	51.09	84	41.41	210	34.500	421	22.31	17	29.057	289	47.66	146
18.8	42.560	355	20.59	194	51.93	92	39.31	160	34.921	435	22.48	49	29.346	300	49.12	145
28.8	42.915	365	18.65	146	52.85	99	37.71	101	35.356	441	22.97	79	29.646	303	50.57	138
Aug. 7.8	43.280	365	17.19	94	53.84	101	36.70	43	35.797	437	23.76	108	29.949	300	51.95	128
17.7	43.645	358	16.25	39	54.85	101	36.27	16	36.234	426	24.84	131	30.249	291	53.23	112
27.7	44.003	342	15.86	18	55.86	98	36.43	80	36.660	406	26.15	153	30.540	278	54.35	96
Sept. 6.7	44.345	318	16.04	74	56.84	91	37.23	142	37.066	384	27.68	172	30.818	259	55.31	75
16.7	44.663	288	16.78	129	57.75	81	38.65	193	37.450	355	29.40	185	31.077	240	56.06	54
26.6	44.951	254	18.07	179	58.56	68	40.58	245	37.805	322	31.25	198	31.317	216	56.60	32
Oct. 6.6	45.205	211	19.86	219	59.24	53	43.03	285	38.127	285	33.23	204	31.533	192	56.92	11
16.6	45.416	169	22.05	256	59.77	36	45.88	316	38.412	245	35.27	209	31.725	165	57.03	7
26.5	45.585	122	24.61	279	60.13	17	49.04	333	38.657	201	37.36	210	31.890	138	56.96	25
Nov. 5.5	45.707	74	27.40	294	60.30	1	52.37	341	38.858	154	39.46	206	32.028	106	56.71	39
15.5	45.781	25	30.34	297	60.29	21	55.78	335	39.012	104	41.52	197	32.134	75	56.32	49
25.5	45.806	22	33.31	289	60.08	39	59.13	315	39.116	50	43.49	185	32.209	44	55.83	57
Dec. 5.4	45.784	69	36.20	268	59.69	56	62.28	287	39.166	5	45.34	166	32.253	9	55.26	62
15.4	45.715	113	38.88	242	59.13	72	65.15	246	39.161	59	47.00	145	32.262	25	54.64	64
25.4	45.602	154	41.30	205	58.41	85	67.61	198	39.102	112	48.45	116	32.237	58	54.00	65
35.4	45.448		43.35		57.56		69.59		38.990		49.61		32.179		53.35	
Mean Place	41.552		43.88		56.939		65.55		31.876		26.37		27.115		40.90	
Sec δ, Tan δ	1.376		−0.945		4.688		−4.580		1.542		+1.174		1.012		+0.154	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.04		+0.04		−0.03		+0.20		+0.08		−0.05		+0.08		−0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.3		+0.8		+0.3		+0.8		+0.3		+0.8		+0.3		+0.8	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Hydri. Mag. 3.2 Right Ascension.		γ Hydri. Declination.		ζ Persei. Mag. 2.9 Right Ascension.		ζ Persei. Declination.		9 H. Camelop. Mag. 5.2 Right Ascension.		9 H. Camelop. Declination.		ε Persei. Mag. 3.0 Right Ascension.		ε Persei. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	3 48		−74 28		3 49		+31 38		3 50		+60 52		3 52		+39 46	
	s		″		s		″		s		″		s		″	
Jan. 0.4	31.63		87.58		4.704		45.66		17.16		34.50		27.615		45.55	
		66		211		67		36		18		165		76		74
10.4	30.97		89.69		4.637		46.02		16.98		36.15		27.539		46.29	
		74		158		107		19		23		127		122		52
20.3	30.23		91.27		4.530		46.21		16.75		37.42		27.417		46.81	
		83		101		141		2		30		87		161		27
30.3	29.40		92.28		4.389		46.23	—	16.45		38.29		27.256		47.08	
		86		43		170		17		34		41		191		1
Feb. 9.3	28.54		92.71	—	4.219		46.06		16.11		38.70	—	27.065		47.09	—
		88		15		188		36		36		6		213		27
19.2	27.66		92.56		4.031		45.70		15.75		38.64		26.852		46.82	
		88		71		196		54		38		52		221		53
Mar. 1.2	26.78		91.85		3.835		45.16		15.37		38.12		26.631		46.29	
		85		126		192		71		36		95		216		79
11.2	25.93		90.59		3.643		44.45		15.01		37.17		26.415		45.50	
		79		175		177		83		34		137		201		99
21.2	25.14		88.84		3.466		43.62		14.67		35.80		26.214		44.51	
		73		220		149		92		28		171		170		116
31.1	24.41		86.64		3.317		42.70		14.39		34.09		26.044		43.35	
		64		260		114		96		23		196		131		126
Apr. 10.1	23.77		84.04		3.203		41.74		14.16		32.13		25.913		42.09	
		53		294		70		96		14		216		83		133
20.1	23.24		81.10		3.133		40.78		14.02		29.97		25.830		40.76	
		40		319		20		91		7		225		29		131
30.1	22.84		77.91		3.113	—	39.87		13.95	—	27.72		25.801	—	39.45	
		28		339		33		80		2		226		30		125
May 10.0	22.56		74.52		3.146		39.07		13.97		25.46		25.831		38.20	
		14		352		86		66		11		220		88		113
20.0	22.42		71.00		3.232		38.41		14.08		23.26		25.919		37.07	
		1		354		138		49		20		204		146		98
30.0	22.41	—	67.46		3.370		37.92		14.28		21.22		26.065		36.09	
		15		349		187		29		29		185		199		76
June 8.9	22.56		63.97		3.557		37.63		14.57		19.37		26.264		35.33	
		28		336		231		10		35		158		247		56
18.9	22.84		60.61		3.788		37.53	—	14.92		17.79		26.511		34.77	
		40		313		268		12		42		126		289		31
28.9	23.24		57.48		4.056		37.65		15.34		16.53		26.800		34.46	
		52		283		298		33		47		95		322		6
July 8.9	23.76		54.65		4.354		37.98		15.81		15.58		27.122		34.40	—
		63		243		321		51		51		58		348		17
18.8	24.39		52.22		4.675		38.49		16.32		15.00		27.470		34.57	
		71		197		336		69		54		22		366		40
28.8	25.10		50.25		5.011		39.18		16.86		14.78	—	27.836		34.97	
		77		145		345		82		56		15		376		61
Aug. 7.8	25.87		48.80		5.356		40.00		17.42		14.93		28.212		35.58	
		81		86		346		94		57		49		379		80
17.8	26.68		47.94		5.702		40.94		17.99		15.42		28.591		36.38	
		82		26		341		103		56		85		376		95
27.7	27.50		47.68	—	6.043		41.97		18.55		16.27		28.967		37.33	
		82		38		332		108		56		116		365		109
Sept. 6.7	28.32		48.06		6.375		43.05		19.11		17.43		29.332		38.42	
		78		100		317		110		53		144		349		121
16.7	29.10		49.06		6.692		44.15		19.64		18.87		29.681		39.63	
		72		159		298		112		49		172		331		129
26.6	29.82		50.65		6.990		45.27		20.13		20.59		30.012		40.92	
		62		214		278		110		47		193		308		134
Oct. 6.6	30.44		52.79		7.268		46.37		20.60		22.52		30.320		42.26	
		53		262		252		107		42		215		282		138
16.6	30.97		55.41		7.520		47.44		21.02		24.67		30.602		43.64	
		40		301		226		103		37		229		251		140
26.6	31.37		58.42		7.746		48.47		21.39		26.96		30.853		45.04	
		27		328		195		98		31		241		218		140
Nov. 5.5	31.64		61.70		7.941		49.45		21.70		29.37		31.071		46.44	
		10		343		162		92		25		247		180		138
15.5	31.74	—	65.13		8.103		50.37		21.95		31.84		31.251		47.82	
		3		347		125		86		19		247		140		134
25.5	31.71		68.60		8.228		51.23		22.14		34.31		31.391		49.16	
		20		337		85		79		11		242		95		127
Dec. 5.5	31.51		71.97		8.313		52.02		22.25		36.73		31.486		50.43	
		33		314		44		68		3		231		48		116
15.4	31.18		75.11		8.357		52.70		22.28	—	39.04		31.534	—	51.59	
		47		283		1		58		5		210		2		104
25.4	30.71		77.94		8.358	—	53.28		22.23		41.14		31.532		52.63	
		59		240		44		46		12		185		50		87
35.4	30.12		80.34		8.314		53.74		22.11		42.99		31.482		53.50	
Mean Place	28.590		74.95		2.169		38.89		13.126		22.62		24.826		37.36	
Sec δ, Tan δ	3.739		−3.602		1.175		+0.616		2.055		+1.795		1.301		+0.833	
$D_\psi\alpha$, $D_\omega\alpha$	−0.02		+0.13		+0.07		−0.02		+0.10		−0.06		+0.08		−0.03	
$D_\psi\delta$, $D_\omega\delta$	+0.2		+0.8		+0.2		+0.8		+0.2		+0.8		+0.2		+0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Persei. Mag. 4.0				γ Eridani. Mag. 3.2				λ Tauri. Var. 3.3–4.2				δ Reticul[i] Mag. 4.[…]		
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		D[eclination.]
	h m 3 53		° ′ +35 33		h m 3 54		° ′ −13 43		h m 3 56		° ′ +12 15		h m 3 57		-
	s		″		s		″		s		″		s		
Jan. 0.4	44.967	68	39.87	56	16.967	72	81.05	152	13.656	51	46.81	50	29.76	30	5
10.4	44.899	111	40.43	37	16.895	106	82.57	130	13.605	87	46.31	51	29.46	36	5
20.3	44.788	149	40.80	16	16.789	134	83.87	104	13.518	119	45.80	48	29.10	41	5
30.3	44.639	177	40.96	7	16.655	158	84.91	76	13.399	144	45.32	48	28.69	44	5
Feb. 9.3	44.462	198	40.89	30	16.497	174	85.67	48	13.255	162	44.84	45	28.25	47	5
19.3	44.264	207	40.59	51	16.323	181	86.15	18	13.093	170	44.39	41	27.78	46	5
Mar. 1.2	44.057	204	40.08	73	16.142	179	86.33	12	12.923	169	43.98	38	27.32	46	5
11.2	43.853	189	39.35	89	15.963	167	86.21	40	12.754	156	43.60	31	26.86	43	5
21.2	43.664	160	38.46	102	15.796	147	85.81	70	12.598	137	43.29	22	26.43	39	5
31.1	43.504	124	37.44	110	15.649	117	85.11	97	12.461	105	43.07	12	26.04	34	5
Apr. 10.1	43.380	78	36.34	113	15.532	82	84.14	126	12.356	68	42.95	1	25.70	29	5
20.1	43.302	28	35.21	110	15.450	40	82.88	149	12.288	26	42.94	14	25.41	21	4
30.1	43.274	28	34.11	102	15.410	3	81.39	173	12.262	19	43.08	31	25.20	13	4
May 10.0	43.302	84	33.09	90	15.413	49	79.66	191	12.281	67	43.39	46	25.07	5	4
20.0	43.386	138	32.19	73	15.462	94	77.75	207	12.348	112	43.85	65	25.02	3	4
30.0	43.524	190	31.46	55	15.556	138	75.68	217	12.460	156	44.50	79	25.05	11	3
June 8.9	43.714	234	30.91	32	15.694	178	73.51	223	12.616	195	45.29	93	25.16	19	3
18.9	43.948	275	30.59	11	15.872	212	71.28	222	12.811	228	46.22	106	25.35	26	2
28.9	44.223	306	30.48	10	16.084	240	69.06	215	13.039	256	47.28	115	25.61	34	2
July 8.9	44.529	331	30.58	33	16.324	265	66.91	203	13.295	277	48.43	120	25.95	39	2
18.8	44.860	349	30.91	51	16.589	280	64.88	184	13.572	292	49.63	121	26.34	43	2
28.8	45.209	357	31.42	70	16.869	290	63.04	158	13.864	301	50.84	117	26.77	47	1
Aug. 7.8	45.566	360	32.12	85	17.159	293	61.46	128	14.165	303	52.01	111	27.24	49	1
17.8	45.926	357	32.97	96	17.452	291	60.18	94	14.468	300	53.12	101	27.73	49	1
27.7	46.283	346	33.93	106	17.743	284	59.24	55	14.768	291	54.13	88	28.22	49	1
Sept. 6.7	46.629	333	34.99	113	18.027	271	58.69	15	15.059	280	55.01	69	28.71	48	1
16.7	46.962	315	36.12	118	18.298	254	58.54	25	15.339	265	55.70	53	29.19	44	1
26.6	47.277	293	37.30	120	18.552	234	58.79	64	15.604	245	56.23	35	29.63	38	1
Oct. 6.6	47.570	268	38.50	120	18.786	211	59.43	100	15.849	225	56.58	15	30.01	33	1
16.6	47.838	240	39.70	119	18.997	186	60.43	132	16.074	200	56.73	1	30.34	29	2
26.6	48.078	208	40.89	116	19.183	156	61.75	158	16.274	174	56.72	15	30.63	20	2
Nov. 5.5	48.286	174	42.05	113	19.339	126	63.33	176	16.448	147	56.57	28	30.83	13	2
15.5	48.460	135	43.18	109	19.465	94	65.09	188	16.595	114	56.29	37	30.96	4	3
25.5	48.595	95	44.27	101	19.559	58	66.97	192	16.709	81	55.92	44	31.00	5	3
Dec. 5.5	48.690	49	45.28	92	19.617	21	68.89	190	16.790	45	55.48	48	30.95	11	3
15.4	48.739	3	46.20	81	19.638	15	70.79	180	16.835	6	55.00	50	30.84	19	41
25.4	48.742	44	47.01	65	19.623	53	72.59	163	16.841	32	54.50	51	30.65	27	44
35.4	48.698		47.66		19.570		74.22		16.809		53.99		30.38		47
Mean Place	42.305		32.63		14.987		77.23		11.446		44.79		27.451		41
Sec δ, Tan δ	1.229		+0.715		1.029		−0.244		1.023		+0.217		2.104		−1
$D_\psi a$, $D_\omega a$	+0.08		−0.03		+0.06		+0.01		+0.07		−0.01		+0.02		+0
$D_\psi \delta$, $D_\omega \delta$	+0.2		+0.9		+0.2		+0.9		+0.2		+0.9		+0.2		+0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ν Tauri. Mag. 3.9 Right Ascension.		ν Tauri. Declination.		A Tauri. Mag. 4.5 Right Ascension.		A Tauri. Declination.		c Persei. Mag. 4.0 Right Ascension.		c Persei. Declination.		p Tauri. Mag. 5.6 Right Ascension.		p Tauri. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	3 58		+ 5 45		3 59		+21 51		4 2		+47 29		4 5		+26 16	
	s		″		s		″		s		″		s		″	
Jan. 0.4	52.904	50	56.16	79	56.599	49	45.85	5	49.704	85	59.71	114	56.161	47	18.67	15
10.4	52.854	87	55.37	72	56.550	88	45.80	14	49.619	137	60.85	89	56.114	89	18.82	5
20.3	52.767	117	54.65	66	56.462	123	45.66	21	49.482	184	61.74	58	56.025	125	18.87	6
30.3	52.650	142	53.99	57	56.339	150	45.45	31	49.298	222	62.32	25	55.900	155	18.81	19
Feb. 9.3	52.508	161	53.42	47	56.189	169	45.14	37	49.076	246	62.57	9	55.745	174	18.62	31
19.3	52.347	169	52.95	37	56.020	179	44.77	45	48.830	260	62.48	42	55.571	186	18.31	43
Mar. 1.2	52.178	167	52.58	25	55.841	178	44.32	51	48.570	255	62.06	76	55.385	187	17.88	53
11.2	52.011	157	52.33	14	55.663	165	43.81	54	48.315	238	61.30	105	55.198	175	17.35	61
21.2	51.854	137	52.19	0	55.498	144	43.27	55	48.077	207	60.25	129	55.023	153	16.74	67
31.1	51.717	107	52.19	16	55.354	112	42.72	53	47.870	164	58.96	148	54.870	121	16.07	69
Apr. 10.1	51.610	72	52.35	31	55.242	73	42.19	47	47.706	111	57.48	161	54.749	81	15.38	67
20.1	51.538	30	52.66	49	55.169	29	41.72	38	47.595	50	55.87	166	54.668	35	14.71	61
30.1	51.508	14	53.15	67	55.140	19	41.34	25	47.545	14	54.21	163	54.633	14	14.10	51
May 10.0	51.522	59	53.82	84	55.159	69	41.09	11	47.559	81	52.58	156	54.647	65	13.59	38
20.0	51.581	105	54.66	100	55.228	118	40.98	4	47.640	145	51.02	143	54.712	115	13.21	22
30.0	51.686	148	55.66	117	55.346	161	41.02	23	47.785	205	49.59	124	54.827	162	12.99	6
June 9.0	51.834	185	56.83	127	55.507	204	41.25	39	47.990	261	48.35	103	54.989	205	12.93	11
18.9	52.019	220	58.10	136	55.711	239	41.64	55	48.251	310	47.32	77	55.194	243	13.04	29
28.9	52.239	248	59.46	141	55.950	270	42.19	69	48.561	349	46.55	50	55.437	273	13.33	45
July 8.9	52.487	269	60.87	142	56.220	291	42.88	81	48.910	381	46.05	23	55.710	297	13.78	59
18.8	52.756	284	62.29	138	56.511	308	43.69	90	49.291	404	45.82	4	56.007	314	14.37	73
28.8	53.040	293	63.67	130	56.819	316	44.59	96	49.695	417	45.86	31	56.321	325	15.10	81
Aug. 7.8	53.333	295	64.97	116	57.135	320	45.55	98	50.112	424	46.17	55	56.646	329	15.91	87
17.8	53.628	293	66.13	100	57.455	315	46.53	97	50.536	422	46.72	79	56.975	326	16.78	90
27.7	53.921	286	67.13	79	57.770	308	47.50	92	50.958	413	47.51	99	57.301	320	17.68	91
Sept. 6.7	54.207	275	67.92	57	58.078	296	48.42	86	51.371	399	48.50	118	57.621	308	18.59	89
16.7	54.482	258	68.49	32	58.374	281	49.28	78	51.770	381	49.68	133	57.929	294	19.48	85
26.7	54.740	242	68.81	9	58.655	262	50.06	67	52.151	356	51.01	147	58.223	276	20.33	79
Oct. 6.6	54.982	219	68.90	15	58.917	241	50.73	57	52.507	328	52.48	158	58.499	253	21.12	71
16.6	55.201	198	68.75	35	59.158	216	51.30	47	52.835	294	54.06	167	58.752	230	21.83	66
26.6	55.399	171	68.40	53	59.374	191	51.77	38	53.129	258	55.73	172	58.982	202	22.49	59
Nov. 5.5	55.570	143	67.87	68	59.565	159	52.15	29	53.387	214	57.45	175	59.184	172	23.08	53
15.5	55.713	112	67.19	78	59.724	127	52.44	20	53.601	168	59.20	174	59.356	139	23.61	47
25.5	55.825	78	66.41	84	59.851	92	52.64	15	53.769	116	60.94	170	59.495	100	24.08	41
Dec. 5.5	55.903	44	65.57	86	59.943	53	52.79	9	53.885	62	62.64	160	59.595	61	24.49	35
15.4	55.947	5	64.71	86	59.996	12	52.88	4	53.947	2	64.24	148	59.656	18	24.84	29
25.4	55.952	32	63.85	83	60.008	28	52.92	3	53.949	53	65.72	129	59.674	25	25.13	19
35.4	55.920		63.02		59.980		52.89		53.896		67.01		59.649		25.32	
Mean Place	50.761		55.73		54.226		41.91		46.541		50.96		53.677		14.15	
Sec δ, Tan δ	1.005		+0.101		1.078		+0.401		1.480		+1.091		1.115		+0.494	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		0.00		+0.07		−0.01		+0.09		−0.04		+0.07		−0.02	
$D_\psi\delta$, $D_\omega\delta$	+0.2		+0.9		+0.2		+0.9		+0.2		+0.9		+0.2		+0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	o^1 Eridani. Mag. 4.1 Right Ascension.		Declination.		μ Tauri. Mag. 4.3 Right Ascension.		Declination.		α Horologii. Mag. 3.8 Right Ascension.		Declination.		α Reticu… Mag. 3.… Right Ascension.	
	h m 4 7		° ′ − 7 2		h m 4 11		° ′ + 8 41		h m 4 11		° ′ −42 29		h m 4 13	
	s		″		s		″		s		″		s	
Jan. 0.4	56.711		54.89		10.275		26.25		21.115		46.88		25.08	
10.4	56.656	55	56.24	135	10.235	40	25.57	68	20.977	138	49.24	236	24.78	30
20.3	56.567	89	57.40	116	10.157	78	24.93	64	20.796	181	51.19	195	24.42	36
30.3	56.445	122	58.37	97	10.045	112	24.36	57	20.579	217	52.70	151	23.99	43
Feb. 9.3	56.299	146	59.12	75	9.906	139	23.84	52	20.334	245	53.72	102	23.53	46
19.3	56.133	166	59.65	53	9.747	159	23.38	46	20.067	267	54.24	52	23.05	48
Mar. 1.2	55.958	175	59.94	29	9.577	170	23.01	37	19.792	275	54.26	2	22.56	49
11.2	55.782	176	60.01	7	9.406	171	22.71	30	19.518	274	53.77	49	22.07	49
21.2	55.617	165	59.82	19	9.244	162	22.52	19	19.257	261	52.81	96	21.61	46
31.2	55.469	148	59.39	43	9.100	144	22.42	10	19.019	238	51.42	139	21.18	43
Apr. 10.1	55.348	121	58.72	67	8.985	115	22.45	3	18.814	205	49.60	182	20.81	37
20.1	55.262	86	57.83	89	8.904	81	22.62	17	18.650	164	47.40	220	20.49	32
30.1	55.215	47	56.69	114	8.864	40	22.93	31	18.533	117	44.88	252	20.24	25
May 10.0	55.212	3	55.35	134	8.868	4	23.41	48	18.468	65	42.10	278	20.06	18
20.0	55.254	42	53.83	152	8.918	50	24.06	65	18.459	9	39.11	299	19.97	9
30.0	55.340	86	52.13	170	9.014	96	24.85	79	18.507	48	35.98	313	19.97	0
June 9.0	55.470	130	50.31	182	9.152	138	25.80	95	18.610	103	32.79	319	20.05	8
18.9	55.639	169	48.41	190	9.330	178	26.87	107	18.765	155	29.62	317	20.21	16
28.9	55.843	204	46.48	193	9.544	214	28.05	118	18.968	203	26.55	307	20.45	24
July 8.9	56.075	232	44.56	192	9.785	241	29.29	124	19.214	246	23.66	289	20.76	31
18.9	56.332	257	42.73	183	10.051	266	30.56	127	19.495	281	21.04	262	21.13	37
28.8	56.605	273	41.04	169	10.333	282	31.81	125	19.806	311	18.77	227	21.56	43
Aug. 7.8	56.890	285	39.53	151	10.625	292	32.99	118	20.138	332	16.91	186	22.02	46
17.8	57.180	290	38.27	126	10.922	297	34.08	109	20.481	343	15.54	137	22.52	50
27.7	57.469	289	37.28	99	11.218	296	35.04	96	20.830	349	14.71	83	23.03	51
Sept. 6.7	57.752	283	36.63	65	11.509	291	35.81	77	21.175	345	14.43	28	23.54	51
16.7	58.025	273	36.32	31	11.789	280	36.40	59	21.510	335	14.74	31	24.03	49
26.7	58.283	258	36.36	4	12.057	268	36.77	37	21.826	316	15.63	89	24.50	47
Oct. 6.6	58.525	242	36.75	39	12.307	250	36.92	15	22.117	291	17.08	145	24.93	43
16.6	58.747	222	37.47	72	12.538	231	36.87	5	22.378	261	19.03	195	25.30	37
26.6	58.944	197	38.47	100	12.747	209	36.62	25	22.602	224	21.41	238	25.62	32
Nov. 5.6	59.115	171	39.72	125	12.932	185	36.21	41	22.785	183	24.15	274	25.85	23
15.5	59.259	144	41.14	142	13.089	157	35.67	54	22.923	138	27.13	298	26.01	16
25.5	59.369	110	42.69	155	13.215	126	35.03	64	23.014	91	30.24	311	26.09	8
Dec. 5.5	59.447	78	44.30	161	13.308	93	34.32	71	23.055	41	33.38	314	26.07	2
15.4	59.488	41	45.90	160	13.365	57	33.60	72	23.044	11	36.42	304	25.98	9
25.4	59.492	4	47.44	154	13.383	18	32.87	73	22.983	61	39.28	286	25.80	18
35.4	59.458	34	48.87	143	13.362	21	32.18	69	22.873	110	41.84	256	25.54	26
Mean Place	54.644		52.24		8.056		25.69		19.047		37.85		22.602	
Sec δ, Tan δ	1.008		−0.124		1.012		+0.153		1.356		−0.916		2.179	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		0.00		+0.06		0.00		+0.04		+0.03		+0.02	
$D_\psi\delta$, $D_\omega\delta$	+0.2		+0.9		+0.2		+0.9		+0.2		+0.9		+0.2	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Tauri. Mag. 3.9 Right Ascension.		γ Tauri. Declination.		δ Tauri. Mag. 3.9 Right Ascension.		δ Tauri. Declination.		υ^5 Eridani. Mag. 4.1 Right Ascension.		υ^5 Eridani. Declination.		δ Mensæ. Mag. 5.6 Right Ascension.		δ Mensæ. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	4 15		+15 25		4 18		+17 21		4 20		−34 11		4 23		−80 23	
	s		″		s		″		s		″		s		″	
Jan. 0.4	13.227		60.73		18.038		14.85		61.707		83.42		29.63		88.78	
10.4	13.189	38	60.37	36	18.003	35	14.58	27	61.608	99	85.70	228	28.63	100	91.24	246
20.3	13.113	76	59.99	38	17.928	75	14.29	29	61.471	137	87.62	192	27.45	118	93.23	199
30.3	13.002	111	59.62	37	17.817	111	13.99	30	61.296	175	89.14	152	26.14	131	94.70	147
Feb. 9.3	12.863	139	59.24	38	17.677	140	13.65	34	61.092	204	90.23	109	24.73	141	95.59	89
19.3	12.701	162	58.86	38	17.514	163	13.30	35	60.868	224	90.88	65	23.27	146	95.94	35
Mar. 1.2	12.528	173	58.48	38	17.339	175	12.92	38	60.631	237	91.07	19	21.78	149	95.73	21
11.2	12.353	175	58.11	37	17.161	178	12.53	39	60.394	237	90.80	27	20.31	147	94.98	75
21.2	12.188	165	57.76	35	16.992	169	12.15	38	60.165	229	90.10	70	18.90	141	93.71	127
31.2	12.038	150	57.45	31	16.842	150	11.79	36	59.956	209	88.97	113	17.57	133	91.96	175
Apr. 10.1	11.920	118	57.22	23	16.720	122	11.48	31	59.775	181	87.45	152	16.38	119	89.79	217
20.1	11.836	84	57.07	15	16.633	87	11.25	23	59.631	144	85.57	188	15.32	106	87.23	256
30.1	11.794	42	57.03	4	16.589	44	11.11	14	59.529	102	83.37	220	14.43	89	84.39	284
May 10.0	11.797	3	57.12	9	16.590	1	11.10	1	59.475	54	80.89	248	13.75	68	81.26	313
20.0	11.847	50	57.37	25	16.638	48	11.21	11	59.471	4	78.20	269	13.27	48	77.98	328
30.0	11.944	97	57.76	39	16.734	96	11.49	28	59.520	49	75.36	284	13.01	26	74.59	339
June 9.0	12.085	141	58.30	54	16.874	140	11.91	42	59.617	97	72.42	294	12.97	4	71.17	342
18.9	12.268	183	58.99	69	17.055	181	12.48	57	59.762	145	69.46	296	13.16	19	67.84	333
28.9	12.487	219	59.80	81	17.273	218	13.18	70	59.950	188	66.56	290	13.57	41	64.64	320
July 8.9	12.734	247	60.71	91	17.522	249	13.98	80	60.177	227	63.80	276	14.17	60	61.67	297
18.9	13.006	272	61.69	98	17.795	273	14.87	89	60.436	259	61.26	254	14.97	80	59.04	263
28.8	13.295	289	62.71	102	18.085	290	15.81	94	60.721	285	59.02	224	15.93	96	56.82	222
Aug. 7.8	13.594	299	63.72	101	18.387	302	16.75	94	61.025	304	57.13	189	17.03	110	55.07	175
17.8	13.901	307	64.70	98	18.695	308	17.68	93	61.341	316	55.68	145	18.23	120	53.85	122
27.7	14.205	304	65.61	91	19.003	308	18.56	88	61.661	320	54.72	96	19.50	127	53.21	64
Sept. 6.7	14.504	299	66.41	80	19.305	302	19.34	78	61.979	318	54.28	44	20.79	129	53.21	0
16.7	14.795	291	67.07	66	19.599	294	20.01	67	62.288	309	54.38	10	22.05	126	53.83	62
26.7	15.072	277	67.59	52	19.881	282	20.56	55	62.584	296	55.03	65	23.26	121	55.05	122
Oct. 6.6	15.333	261	67.96	37	20.148	267	20.98	42	62.859	275	56.21	118	24.35	109	56.86	181
16.6	15.576	243	68.17	21	20.395	247	21.25	27	63.109	250	57.87	166	25.31	96	59.19	233
26.6	15.796	220	68.24	7	20.622	227	21.41	16	63.329	220	59.96	209	26.07	76	61.96	277
Nov. 5.6	15.992	196	68.19	5	20.822	200	21.45	4	63.516	187	62.39	243	26.64	57	65.10	314
15.5	16.159	167	68.04	15	20.995	173	21.40	5	63.664	148	65.09	270	26.96	32	68.45	335
25.5	16.296	137	67.79	25	21.138	143	21.27	13	63.772	108	67.94	285	27.05	9	71.91	346
Dec. 5.5	16.398	102	67.50	29	21.244	106	21.09	18	63.836	64	70.84	290	26.86	19	75.38	347
15.4	16.463	65	67.17	33	21.313	69	20.88	21	63.856	20	73.69	285	26.44	42	78.67	329
25.4	16.488	25	66.82	35	21.342	29	20.65	23	63.829	27	76.39	270	25.78	66	81.74	307
35.4	16.472	16	66.46	36	21.329	13	20.39	26	63.756	73	78.84	245	24.91	87	84.43	269
Mean Place	10.901		58.98		15.670		12.87		59.644		75.70		24.703		77.28	
Sec δ, Tan δ	1.037		+0.276		1.048		+0.313		1.209		−0.680		5.999		−5.915	
$D_\psi a$, $D_\omega a$	+0.07		−0.01		+0.07		−0.01		+0.04		+0.02		−0.08		+0.16	
$D_\psi \delta$, $D_\omega \delta$	+0.2		+0.9		+0.2		+0.9		+0.2		+0.9		+0.2		+0.9	

5934°—1919——23

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Aurigæ. Var. 3.0–4.5				β Camelop. Mag. 4.2				ζ Aurigæ. Mag. 3.9				ι Tauri. Mag. 4.7		
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Dec ti
	h m		° ′		h m		° ′		h m		° ′		h m		
	4 56		+43 42		4 56		+60 19		4 56		+40 57		4 58		+2
	s		″		s		″		s		″		s		″
Jan. 0.4	12.435		20.69		16.72		37.50		51.878		35.48		17.735		31.
10.4	12.421	14	21.84	115	16.67	5	39.49	199	51.867	11	36.49	101	17.734	1	31.
20.4	12.348	73	22.86	102	16.53	14	41.24	175	51.801	66	37.38	89	17.687	47	31.
30.3	12.221	127	23.68	82	16.32	21	42.69	145	51.683	118	38.09	71	17.598	89	31.
Feb. 9.3	12.048	173	24.27	59	16.04	28	43.79	110	51.519	164	38.60	51	17.471	127	31.
19.3	11.837	211	24.59	32	15.70	34	44.48	69	51.320	199	38.86	26	17.314	157	30.
Mar. 1.3	11.602	235	24.64	5	15.34	36	44.73	25	51.097	223	38.88	2	17.138	176	30.
11.2	11.356	246	24.39	25	14.96	38	44.53	20	50.863	234	38.63	25	16.951	187	30.
21.2	11.112	244	23.87	52	14.59	37	43.91	62	50.631	232	38.14	49	16.766	185	30.
31.2	10.886	226	23.08	79	14.24	35	42.87	104	50.416	215	37.41	73	16.594	172	29.
Apr. 10.2	10.691	195	22.08	100	13.95	29	41.49	138	50.229	187	36.49	92	16.444	150	29.
20.1	10.536	155	20.91	117	13.70	25	39.80	169	50.082	147	35.42	107	16.326	118	29.
30.1	10.432	104	19.62	129	13.53	17	37.89	191	49.982	100	34.24	118	16.247	79	28.
May 10.1	10.384	48	18.26	136	13.43	10	35.81	208	49.937	45	33.02	122	16.212	35	28.
20.0	10.395	11	16.90	136	13.42	1	33.66	215	49.949	12	31.80	122	16.224	12	28.
30.0	10.466	71	15.58	132	13.51	9	31.51	215	50.018	69	30.63	117	16.284	60	28.
June 9.0	10.596	130	14.35	123	13.67	16	29.44	207	50.144	126	29.55	108	16.390	106	28.
19.0	10.783	187	13.25	110	13.90	23	27.47	197	50.323	179	28.59	96	16.539	149	28.
28.9	11.018	235	12.31	94	14.21	31	25.69	178	50.550	227	27.79	80	16.727	188	28.
July 8.9	11.297	279	11.55	76	14.59	38	24.14	155	50.820	270	27.16	63	16.951	224	29.
18.9	11.614	317	10.97	58	15.02	43	22.85	129	51.125	305	26.71	45	17.203	252	29.
28.9	11.961	347	10.60	37	15.50	48	21.83	102	51.458	333	26.45	26	17.478	275	30.
Aug. 7.8	12.329	368	10.43	17	16.01	51	21.12	71	51.814	356	26.36	9	17.771	293	30.
17.8	12.713	384	10.44	1	16.55	54	20.71	41	52.183	369	26.45	9	18.076	305	31.
27.8	13.106	393	10.64	20	17.10	55	20.62	9	52.561	378	26.69	24	18.386	310	31.
Sept. 6.7	13.502	396	11.00	36	17.66	56	20.84	22	52.941	380	27.07	38	18.699	313	32.
16.7	13.896	394	11.52	52	18.22	56	21.35	51	53.318	377	27.58	51	19.009	310	32.
26.7	14.281	385	12.19	67	18.76	54	22.16	81	53.688	370	28.21	63	19.312	303	33.
Oct. 6.7	14.654	373	12.98	79	19.29	53	23.25	109	54.046	358	28.95	74	19.606	294	33.
16.6	15.008	354	13.89	91	19.79	50	24.60	135	54.387	341	29.77	82	19.886	280	33.
26.6	15.341	333	14.91	102	20.26	47	26.18	158	54.707	320	30.68	91	20.149	263	33.
Nov. 5.6	15.646	305	16.03	112	20.69	43	27.97	179	55.000	293	31.66	98	20.392	243	33.
15.6	15.917	271	17.24	121	21.06	37	29.95	198	55.261	261	32.71	105	20.609	217	33.
25.5	16.148	231	18.51	127	21.37	31	32.07	212	55.484	223	33.83	112	20.796	187	33.
Dec. 5.5	16.332	184	19.82	131	21.61	24	34.27	220	55.664	180	34.97	114	20.948	152	33.
15.5	16.465	133	21.14	132	21.78	17	36.51	224	55.795	131	36.12	115	21.061	113	33.
25.4	16.543	78	22.44	130	21.85	7	38.72	221	55.872	77	37.26	114	21.130	69	33.
35.4	16.561	18	23.66	122	21.84	1	40.80	208	55.893	21	38.34	108	21.155	25	33.
Mean Place	9.224		17.12		12.329		32.10		48.782		32.32		15.176		31.
Sec δ, Tan δ	1.383		+0.956		2.020		+1.755		1.324		+0.868		1.075		+0.
$D_\psi \alpha$, $D_\omega \alpha$	+0.09		−0.02		+0.11		−0.03		+0.08		−0.02		+0.07		−0.
$D_\psi \delta$, $D_\omega \delta$	+0.1		+1.0		+0.1		+1.0		+0.1		+1.0		+0.1		+1.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	μ Aurigæ. Mag. 4.8 Right Ascension.		Declination.		19 H. Camelop. Mag. 5.2 Right Ascension.		Declination.		μ Leporis. Mag. 3.3 Right Ascension.		Declination.		β Orionis. (Rigel.) Mag. 0.3 Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	5 7		+38 23		5 9		+79 8		5 9		−16 17		5 10		− 8 17	
	s		″		s		″		s		″		s		″	
Jan. 0.4	55.975	5	25.31	89	21.15	23	33.72	279	19.757	18	66.94	199	40.900	7	43.53	164
10.4	55.980	53	26.20	80	20.92	44	36.51	253	19.739	61	68.93	178	40.893	49	45.17	147
20.4	55.927	103	27.00	66	20.48	65	39.04	216	19.678	101	70.71	151	40.844	90	46.64	125
30.4	55.824	149	27.66	49	19.83	81	41.20	173	19.577	136	72.22	122	40.754	125	47.89	103
Feb. 9.3	55.675	186	28.15	29	19.02	94	42.93	122	19.441	166	73.44	91	40.629	154	48.92	77
19.3	55.489	212	28.44	7	18.08	103	44.15	66	19.275	184	74.35	59	40.475	174	49.69	53
Mar. 1.3	55.277	225	28.51	17	17.05	108	44.81	8	19.091	196	74.94	25	40.301	185	50.22	27
11.2	55.052	225	28.34	39	15.97	106	44.89	50	18.895	196	75.19	7	40.116	185	50.49	2
21.2	54.827	210	27.95	60	14.91	101	44.39	104	18.699	186	75.12	37	39.931	177	50.51	25
31.2	54.617	187	27.35	79	13.90	91	43.35	155	18.513	167	74.75	70	39.754	157	50.26	48
Apr. 10.2	54.430	149	26.56	92	12.99	77	41.80	198	18.346	140	74.05	99	39.597	129	49.78	74
20.1	54.281	105	25.64	102	12.22	59	39.82	233	18.206	105	73.06	128	39.468	97	49.04	96
30.1	54.176	54	24.62	107	11.63	42	37.49	260	18.101	66	71.78	153	39.371	58	48.08	119
May 10.1	54.122	1	23.55	108	11.21	19	34.89	278	18.035	23	70.25	175	39.313	15	46.89	139
20.1	54.123	55	22.47	103	11.02	0	32.11	287	18.012	21	68.50	194	39.298	28	45.50	156
30.0	54.178	110	21.44	97	11.02	23	29.24	286	18.033	64	66.56	210	39.326	71	43.94	170
June 9.0	54.288	161	20.47	85	11.25	42	26.38	278	18.097	107	64.46	219	39.397	111	42.24	180
19.0	54.449	209	19.62	72	11.67	63	23.60	260	18.204	147	62.27	222	39.508	150	40.44	185
28.9	54.658	251	18.90	57	12.30	80	21.00	239	18.351	181	60.05	220	39.658	184	38.59	186
July 8.9	54.909	285	18.33	42	13.10	95	18.61	209	18.532	212	57.85	210	39.842	213	36.73	180
18.9	55.194	314	17.91	25	14.05	109	16.52	176	18.744	238	55.75	196	40.055	237	34.93	167
28.9	55.508	337	17.66	11	15.14	120	14.76	141	18.982	258	53.79	172	40.292	257	33.26	151
Aug. 7.8	55.845	353	17.55	3	16.34	129	13.35	100	19.240	273	52.07	145	40.549	270	31.75	128
17.8	56.198	362	17.58	16	17.63	134	12.35	58	19.513	282	50.62	111	40.819	279	30.47	102
27.8	56.560	367	17.74	29	18.97	139	11.77	16	19.795	288	49.51	72	41.098	284	29.45	66
Sept. 6.8	56.927	366	18.03	39	20.36	140	11.61	26	20.083	287	48.79	30	41.382	283	28.79	32
16.7	57.293	361	18.42	47	21.76	137	11.87	69	20.370	283	48.49	14	41.665	280	28.47	3
26.7	57.654	350	18.89	56	23.13	135	12.56	111	20.653	274	48.63	57	41.945	271	28.50	42
Oct. 6.7	58.004	336	19.45	64	24.48	127	13.67	151	20.927	260	49.20	100	42.216	259	28.92	77
16.6	58.340	319	20.09	71	25.75	119	15.18	187	21.187	244	50.20	137	42.475	244	29.69	109
26.6	58.659	294	20.80	78	26.94	106	17.05	222	21.431	222	51.57	171	42.719	224	30.78	139
Nov. 5.6	58.953	265	21.58	84	28.00	93	19.27	252	21.653	196	53.28	196	42.943	199	32.17	161
15.6	59.218	229	22.42	90	28.93	75	21.79	275	21.849	166	55.24	217	43.142	170	33.78	176
25.5	59.447	189	23.32	94	29.68	56	24.54	293	22.015	131	57.41	226	43.312	138	35.54	185
Dec. 5.5	59.636	141	24.26	97	30.24	36	27.47	301	22.146	93	59.67	228	43.450	101	37.39	188
15.5	59.777	89	25.23	98	30.60	12	30.48	302	22.239	50	61.95	223	43.551	60	39.27	183
25.5	59.866	35	26.21	94	30.72	10	33.50	291	22.289	7	64.18	211	43.611	17	41.10	173
35.4	59.901		27.15		30.62		36.41		22.296		66.29		43.628		42.83	
Mean Place	52.945		23.39		10.862		28.38		17.549		61.71		38.656		39.27	
Sec δ, Tan δ	1.276		+0.792		5.308		+5.213		1.042		−0.292		1.011		−0.146	
$D_{\psi}a$, $D_{\omega}a$	+0.08		−0.01		+0.20		−0.08		+0.05		0.00		+0.06		0.00	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.1		+1.0		+0.1		+1.0		+0.1		+1.0		+0.1		+1.0	

FOR THE UPPER TRANSIT AT .

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Orionis. Mag. 2.0				α Columbæ. Mag. 2.8				o Aurigæ. Mag. 5.5				ζ Leporis. Mag. 3.7			
	Right Ascension.	Diff.	Declination.	Diff.	Right Ascension.	Diff.	Declination.	Diff.	Right Ascension.	Diff.	Declination.	Diff.	Right Ascension.	Diff.	Declination.	Diff.
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	5 36		− 1 58		5 36		−34 6		5 39		+49 47		5 43		−14 50	
	s		″		s		″		s		″		s		″	
Jan. 0.5	42.615	22	68.62	142	45.260	25	66.70	282	41.028	37	32.09	156	19.362	15	69.76	208
10.4	42.637	24	70.04	128	45.235	76	69.52	254	41.065	34	33.65	147	19.377	32	71.84	190
20.4	42.613	66	71.32	110	45.159	123	72.06	220	41.031	102	35.12	133	19.345	76	73.74	164
30.4	42.547	105	72.42	92	45.036	167	74.26	183	40.929	161	36.45	110	19.269	116	75.38	138
Feb. 9.3	42.442	137	73.34	71	44.869	201	76.09	141	40.768	213	37.55	85	19.153	148	76.76	107
19.3	42.305	163	74.05	52	44.668	226	77.50	96	40.555	252	38.40	54	19.005	175	77.83	76
Mar. 1.3	42.142	177	74.57	33	44.442	242	78.46	51	40.303	275	38.94	21	18.830	190	78.59	46
11.3	41.965	182	74.90	12	44.200	247	78.97	6	40.028	284	39.15	13	18.640	196	79.05	13
21.2	41.783	178	75.02	7	43.953	241	79.03	39	39.744	275	39.02	46	18.444	192	79.18	18
31.2	41.605	162	74.95	27	43.712	225	78.64	83	39.469	252	38.56	77	18.252	179	79.00	47
Apr. 10.2	41.443	139	74.68	47	43.487	198	77.81	123	39.217	216	37.79	104	18.073	154	78.53	78
20.2	41.304	108	74.21	64	43.289	165	76.58	161	39.001	169	36.75	127	17.919	125	77.75	106
30.1	41.196	71	73.57	84	43.124	125	74.97	196	38.832	113	35.48	145	17.794	91	76.69	130
May 10.1	41.125	32	72.73	100	42.999	81	73.01	225	38.719	52	34.03	155	17.703	49	75.39	155
20.1	41.093	11	71.73	115	42.918	34	70.76	251	38.667	12	32.48	163	17.654	8	73.84	174
30.0	41.104	52	70.58	130	42.884	14	68.25	268	38.679	77	30.85	161	17.646	35	72.10	191
June 9.0	41.156	92	69.28	139	42.898	63	65.57	280	38.756	141	29.24	158	17.681	76	70.19	202
19.0	41.248	132	67.89	146	42.961	108	62.77	285	38.897	198	27.66	150	17.757	116	68.17	208
29.0	41.380	166	66.43	148	43.069	151	59.92	282	39.095	251	26.16	138	17.873	152	66.09	209
July 8.9	41.546	196	64.95	148	43.220	189	57.10	270	39.346	298	24.78	121	18.025	184	64.00	203
18.9	41.742	222	63.47	138	43.409	225	54.40	250	39.644	339	23.57	104	18.209	213	61.97	191
28.9	41.964	243	62.09	126	43.634	255	51.90	222	39.983	371	22.53	85	18.422	236	60.06	170
Aug. 7.9	42.207	261	60.83	110	43.889	278	49.68	187	40.354	399	21.68	65	18.658	255	58.36	147
17.8	42.468	271	59.73	86	44.167	297	47.81	143	40.753	417	21.03	45	18.913	269	56.89	114
27.8	42.739	279	58.87	62	44.464	309	46.38	93	41.170	430	20.58	24	19.182	280	55.75	78
Sept. 6.8	43.018	283	58.25	31	44.773	316	45.45	42	41.600	437	20.34	4	19.462	284	54.97	38
16.7	43.301	283	57.94	1	45.089	317	45.03	14	42.037	439	20.30	16	19.746	286	54.59	4
26.7	43.584	279	57.95	31	45.406	311	45.17	71	42.476	434	20.46	36	20.032	284	54.63	47
Oct. 6.7	43.863	272	58.26	64	45.717	299	45.88	125	42.910	423	20.82	55	20.316	276	55.10	89
16.7	44.135	259	58.90	90	46.016	283	47.13	176	43.333	406	21.37	76	20.592	263	55.99	129
26.6	44.394	244	59.80	117	46.299	259	48.89	221	43.739	383	22.13	93	20.855	247	57.28	163
Nov. 5.6	44.638	224	60.97	134	46.558	230	51.10	258	44.122	350	23.06	112	21.102	226	58.91	191
15.6	44.862	198	62.31	150	46.788	193	53.68	285	44.472	310	24.18	128	21.328	197	60.82	213
25.6	45.060	166	63.81	158	46.981	152	56.53	304	44.782	263	25.46	142	21.525	165	62.95	225
Dec. 5.5	45.226	130	65.39	160	47.133	107	59.57	310	45.045	206	26.88	152	21.690	127	65.20	231
15.5	45.356	92	66.99	156	47.240	57	62.67	306	45.251	143	28.40	159	21.817	86	67.51	227
25.5	45.448	47	68.55	148	47.297	5	65.73	293	45.394	76	29.99	159	21.903	40	69.78	218
35.4	45.495		70.03		47.302		68.66		45.470		31.58		21.943		71.96	
Mean Place	40.282		64.42		42.954		60.00		37.398		31.94		17.080		64.39	
Sec δ, Tan δ	1.001		−0.035		1.208		−0.677		1.549		+1.183		1.035		−0.265	
$D_\psi a$, $D_\omega a$	+0.06		0.00		+0.04		0.00		+0.09		−0.01		+0.05		0.00	
$D_\psi \delta$, $D_\omega \delta$	0.0		+1.0		0.0		+1.0		0.0		+1.0		0.0		+1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	22 H. Camelop. Mag. 4.7				η Geminorum. Var. 3.2–4.2			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 6 9		° ′ +69 20		h m 6 9		° ′ +22 31	
	s		″		s		″	
Jan. 0.5	61.50	7	59.55	253	62.024	69	49.12	6
10.5	61.57	4	62.08	246	62.093	17	49.06	1
20.4	61.53	17	64.54	229	62.110	33	49.07	6
30.4	61.36	29	66.83	201	62.077	81	49.13	10
Feb. 9.4	61.07	40	68.84	166	61.996	123	49.23	10
19.3	60.67	46	70.50	125	61.873	155	49.33	7
Mar. 1.3	60.21	52	71.75	78	61.718	178	49.40	4
11.3	59.69	55	72.53	28	61.540	190	49.44	1
21.3	59.14	55	72.81	22	61.350	190	49.43	6
31.2	58.59	52	72.59	71	61.160	180	49.37	12
Apr. 10.2	58.07	48	71.88	116	60.980	158	49.25	16
20.2	57.59	39	70.72	157	60.822	128	49.09	19
30.2	57.20	32	69.15	191	60.694	93	48.90	21
May 10.1	56.88	22	67.24	219	60.601	51	48.69	19
20.1	56.66	12	65.05	238	60.550	8	48.50	18
30.1	56.54	0	62.67	250	60.542	36	48.32	13
June 9.0	56.54	12	60.17	256	60.578	80	48.19	9
19.0	56.66	22	57.61	254	60.658	121	48.10	4
29.0	56.88	32	55.07	245	60.779	159	48.06	1
July 9.0	57.20	42	52.62	231	60.938	193	48.07	4
18.9	57.62	51	50.31	211	61.131	223	48.11	7
28.9	58.13	57	48.20	189	61.354	249	48.18	9
Aug. 7.9	58.70	63	46.31	160	61.603	269	48.27	7
17.9	59.33	69	44.71	131	61.872	285	48.34	5
27.8	60.02	72	43.40	99	62.157	298	48.39	0
Sept. 6.8	60.74	76	42.41	65	62.455	308	48.39	6
16.8	61.50	77	41.76	28	62.763	312	48.33	14
26.7	62.27	77	41.48	7	63.075	314	48.19	21
Oct. 6.7	63.04	76	41.55	44	63.389	312	47.98	27
16.7	63.80	74	41.99	81	63.701	304	47.71	33
26.7	64.54	70	42.80	118	64.005	295	47.38	36
Nov. 5.6	65.24	65	43.98	152	64.300	277	47.02	37
15.6	65.89	58	45.50	183	64.577	254	46.65	36
25.6	66.47	49	47.33	211	64.831	223	46.29	32
Dec. 5.6	66.96	39	49.44	233	65.054	188	45.97	23
15.5	67.35	28	51.77	247	65.242	145	45.74	18
25.5	67.63	16	54.24	256	65.387	97	45.56	9
35.5	67.79		56.80		65.484		45.47	
Mean Place	55.461		61.52		59.344		53.15	
Sec δ, Tan δ	2.835		+2.653		1.083		+0.415	
Dψα, Dωα	+0.13		+0.01		+0.07		0.00	
Dψδ, Dωδ	0.0		+1.0		0.0		+1.0	

Washington Mean Time.	2 Lyncis. Mag. 4.4				ζ Canis Majoris. Mag. 3.1			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 6 12		° ′ +59 2		h m 6 17		° ′ −30 1	
	s		″		s		″	
Jan. 0.5	33.189	88	28.75	206	14.484	28	42.93	288
10.5	33.277	3	30.81	201	14.512	25	45.81	267
20.4	33.274	91	32.82	189	14.487	76	48.48	240
30.4	33.183	173	34.71	168	14.411	122	50.88	206
Feb. 9.4	33.010	244	36.39	141	14.289	163	52.94	168
19.3	32.766	301	37.80	106	14.126	194	54.62	128
Mar. 1.3	32.465	340	38.86	68	13.932	217	55.90	87
11.3	32.125	362	39.54	27	13.715	229	56.77	45
21.3	31.763	362	39.81	16	13.486	230	57.22	1
31.2	31.401	346	39.65	56	13.256	220	57.23	40
Apr. 10.2	31.055	311	39.09	94	13.036	203	56.83	81
20.2	30.744	263	38.15	128	12.833	176	56.02	119
30.2	30.481	202	36.87	158	12.657	143	54.83	154
May 10.1	30.279	131	35.29	179	12.514	104	53.29	185
20.1	30.148	56	33.50	196	12.410	62	51.44	213
30.1	30.092	21	31.54	206	12.348	18	49.31	235
June 9.0	30.113	98	29.48	210	12.330	26	46.96	251
19.0	30.211	172	27.38	208	12.356	70	44.45	262
29.0	30.383	243	25.30	200	12.426	111	41.83	263
July 9.0	30.626	306	23.30	189	12.537	150	39.20	258
18.9	30.932	362	21.41	173	12.687	184	36.62	245
28.9	31.294	410	19.68	154	12.871	216	34.17	223
Aug. 7.9	31.704	453	18.14	133	13.087	243	31.94	194
17.9	32.157	485	16.81	108	13.330	267	30.00	156
27.8	32.642	510	15.73	84	13.597	284	28.44	114
Sept. 6.8	33.152	528	14.89	57	13.881	298	27.30	64
16.8	33.680	541	14.32	29	14.179	307	26.66	12
26.7	34.221	543	14.03	2	14.486	309	26.54	42
Oct. 6.7	34.764	536	14.01	28	14.795	305	26.96	97
16.7	35.300	524	14.29	56	15.100	298	27.93	147
26.7	35.824	501	14.85	86	15.398	283	29.40	194
Nov. 5.6	36.325	467	15.71	114	15.681	260	31.34	234
15.6	36.792	421	16.85	139	15.941	233	33.68	267
25.6	37.213	366	18.24	164	16.174	196	36.35	289
Dec. 5.6	37.579	300	19.88	183	16.370	154	39.24	301
15.5	37.879	221	21.71	198	16.524	108	42.25	303
25.5	38.100	137	23.69	207	16.632	58	45.28	297
35.5	38.237		25.76		16.690		48.25	
Mean Place	28.801		31.41		12.133		37.07	
Sec δ, Tan δ	1.944		+1.667		1.155		−0.578	
Dψα, Dωα	+0.11		+0.01		+0.05		0.00	
Dψδ, Dωδ	0.0		+1.0		0.0		+1.0	

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FOR THE UPPER TRANSIT AT

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FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Canis Majoris. Mag. 4.1				δ Canis Majoris. Mag. 2.0				63 Aurigæ. Mag. 5.1				51 Geminorum. Mag. 5.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 7 0		° ′ −15 30		h m 7 5		° ′ −26 15		h m 7 6		° ′ +39 26		h m 7 8		° ′ +16 17	
	s		″		s		″		s		″		s		″	
Jan. 0.5	7.983	90	51.43	240	8.165	85	54.78	291	8.338	144	66.41	86	45.855	124	43.73	60
10.5	8.073	40	53.83	225	8.250	32	57.69	277	8.482	84	67.27	98	45.979	73	43.13	45
20.5	8.113	10	56.08	203	8.282	20	60.46	253	8.566	19	68.25	105	46.052	21	42.68	31
30.4	8.103	58	58.11	179	8.262	71	62.99	225	8.585	44	69.30	107	46.073	30	42.37	17
Feb. 9.4	8.045	101	59.90	149	8.191	116	65.24	191	8.541	101	70.37	101	46.043	76	42.20	8
19.4	7.944	137	61.39	119	8.075	154	67.15	158	8.440	149	71.38	91	45.967	116	42.12	1
Mar. 1.4	7.807	165	62.58	88	7.921	183	68.73	119	8.291	187	72.29	75	45.851	147	42.13	7
11.3	7.642	183	63.46	56	7.738	202	69.92	79	8.104	214	73.04	57	45.704	169	42.20	10
21.3	7.459	191	64.02	24	7.536	213	70.71	41	7.890	226	73.61	34	45.535	179	42.30	12
31.3	7.268	190	64.26	6	7.323	212	71.12	1	7.664	227	73.95	11	45.356	178	42.42	13
Apr. 10.2	7.078	179	64.20	37	7.111	201	71.13	38	7.437	213	74.06	13	45.178	166	42.55	13
20.2	6.899	158	63.83	67	6.910	183	70.75	75	7.224	190	73.93	35	45.012	150	42.68	12
30.2	6.741	134	63.16	93	6.727	157	70.00	110	7.034	156	73.58	56	44.862	122	42.80	13
May 10.2	6.607	103	62.23	119	6.570	126	68.90	141	6.878	116	73.02	74	44.740	91	42.93	14
20.1	6.504	67	61.04	141	6.444	91	67.49	171	6.762	72	72.28	88	44.649	54	43.07	14
30.1	6.437	31	59.63	163	6.353	52	65.78	196	6.690	24	71.40	99	44.595	17	43.21	16
June 9.1	6.406	7	58.00	176	6.301	13	63.82	216	6.666	24	70.41	107	44.578	24	43.37	18
19.1	6.413	44	56.24	188	6.288	28	61.66	230	6.690	72	69.34	113	44.602	61	43.55	19
29.0	6.457	81	54.36	193	6.316	66	59.36	237	6.762	118	68.21	116	44.663	95	43.74	19
July 9.0	6.538	115	52.43	193	6.382	103	56.99	238	6.880	161	67.05	115	44.758	131	43.93	18
19.0	6.653	146	50.50	186	6.485	138	54.61	232	7.041	201	65.90	114	44.889	163	44.11	16
28.9	6.799	177	48.64	172	6.623	172	52.29	215	7.242	235	64.76	111	45.052	190	44.27	11
Aug. 7.9	6.976	204	46.92	153	6.795	202	50.14	194	7.477	268	63.65	107	45.242	215	44.38	5
17.9	7.180	226	45.39	126	6.997	228	48.20	163	7.745	295	62.58	101	45.457	238	44.43	5
27.9	7.406	246	44.13	94	7.225	253	46.57	126	8.040	318	61.57	96	45.695	257	44.38	17
Sept. 6.8	7.652	264	43.19	56	7.478	272	45.31	83	8.358	339	60.61	89	45.952	273	44.21	30
16.8	7.916	278	42.63	15	7.750	289	44.48	35	8.697	357	59.72	81	46.225	287	43.91	43
26.8	8.194	287	42.48	28	8.039	300	44.13	17	9.054	368	58.91	71	46.512	298	43.48	57
Oct. 6.8	8.481	293	42.76	73	8.339	307	44.30	68	9.422	375	58.20	61	46.810	306	42.91	72
16.7	8.774	294	43.49	114	8.646	308	44.98	119	9.797	379	57.59	49	47.116	309	42.19	83
26.7	9.068	290	44.63	154	8.954	302	46.17	166	10.176	376	57.10	35	47.425	306	41.36	92
Nov. 5.7	9.358	278	46.17	187	9.256	290	47.83	209	10.552	365	56.75	16	47.731	299	40.44	97
15.6	9.636	259	48.04	215	9.546	268	49.92	245	10.917	345	56.59	1	48.030	286	39.47	99
25.6	9.895	234	50.19	235	9.814	242	52.37	271	11.262	317	56.60	22	48.316	262	38.48	96
Dec. 5.6	10.129	201	52.54	247	10.056	205	55.08	288	11.579	280	56.82	42	48.578	233	37.52	89
15.6	10.330	161	55.01	250	10.261	162	57.96	296	11.859	232	57.24	61	48.811	195	36.63	79
25.5	10.491	116	57.51	246	10.423	115	60.92	295	12.091	179	57.85	80	49.006	151	35.84	66
35.5	10.607		59.97		10.538		63.87		12.270		58.65		49.157		35.18	
Mean Place	5.649		45.69		5.807		49.59		5.255		74.30		43.313		51.06	
Sec δ, Tan δ	1.038		−0.278		1.115		−0.494		1.295		+0.823		1.042		+0.292	
$D_\psi\alpha$, $D_\omega\alpha$	+0.05		0.00		+0.05		−0.01		+0.08		+0.02		+0.08		+0.01	
$D_\psi\delta$, $D_\omega\delta$	−0.1		+1.0		−0.1		+1.0		−0.1		+1.0		−0.1		+1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ^2 Volantis. Mag. 3.9 Right Ascension.		Declination.		λ Geminorum. Mag. 3.6 Right Ascension.		Declination.		τ Argus. Mag. 2.7 Right Ascension.		Declination.		δ Geminorum. Mag. 3.5 Right Ascension.		Declination.
	h m 7 9		° ′ −70 21		h m 7 13		° ′ +16 40		h m 7 14		° ′ −36 56		h m 7 15		° +22
	s		″		s		″		s		″		s		″
Jan. 0.5	30.30		66.36		28.914		67.53		19.365		70.10		19.883		49.45
10.5	30.30	0	70.18	382	29.043	129	66.94	59	19.451	86	73.43	333	20.018	135	49.22
20.5	30.17	13	73.88	370	29.120	77	66.51	43	19.478	27	76.63	320	20.101	83	49.12
30.4	29.92	25	77.37	349	29.146	26	66.22	29	19.446	32	79.60	297	20.130	29	49.16
Feb. 9.4	29.55	37	80.57	320	29.120	26	66.06	16	19.360	86	82.29	269	20.106	24	49.30
19.4	29.09	46	83.40	283	29.047	73	66.01	5	19.224	136	84.63	234	20.033	73	49.53
Mar. 1.4	28.54	55	85.80	240	28.933	114	66.04	3	19.046	178	86.57	194	19.917	116	49.79
11.3	27.93	61	87.72	192	28.789	144	66.13	9	18.834	212	88.09	152	19.769	148	50.06
21.3	27.27	66	89.12	140	28.621	168	66.25	12	18.600	234	89.16	107	19.597	172	50.32
31.3	26.59	68	90.01	89	28.443	178	66.39	14	18.354	246	89.78	62	19.413	184	50.53
Apr. 10.3	25.90	69	90.36	35	28.265	178	66.53	14	18.107	247	89.94	16	19.229	184	50.69
20.2	25.22	68	90.17	19	28.096	169	66.66	13	17.868	239	89.66	28	19.054	175	50.79
30.2	24.58	64	89.47	70	27.945	151	66.80	14	17.648	220	88.93	73	18.898	156	50.84
May 10.2	23.98	60	88.26	121	27.821	124	66.93	13	17.452	196	87.79	114	18.769	129	50.83
20.1	23.45	53	86.58	168	27.728	93	67.05	12	17.289	163	86.26	153	18.671	98	50.77
30.1	22.98	47	84.47	211	27.670	58	67.19	14	17.163	126	84.39	187	18.610	61	50.67
June 9.1	22.61	37	81.98	249	27.650	20	67.33	14	17.077	86	82.22	217	18.588	22	50.55
19.1	22.34	27	79.19	279	27.669	19	67.48	15	17.032	45	79.81	241	18.605	17	50.41
29.0	22.16	18	76.16	303	27.725	56	67.64	16	17.032	0	77.20	261	18.662	57	50.26
July 9.0	22.09	7	72.99	317	27.816	91	67.80	16	17.075	43	74.49	271	18.756	94	50.10
19.0	22.13	4	69.76	323	27.943	127	67.95	15	17.161	86	71.75	274	18.886	130	49.91
29.0	22.28	15	66.56	320	28.101	158	68.07	12	17.288	127	69.07	268	19.048	162	49.71
Aug. 7.9	22.55	27	63.52	304	28.286	185	68.14	7	17.454	166	66.54	253	19.239	191	49.47
17.9	22.90	35	60.71	281	28.498	212	68.14	0	17.656	202	64.24	230	19.457	218	49.18
27.9	23.35	45	58.25	246	28.732	234	68.04	10	17.890	234	62.26	198	19.698	241	48.84
Sept. 6.8	23.88	53	56.22	203	28.987	255	67.83	21	18.155	265	60.68	158	19.961	263	48.42
16.8	24.47	59	54.72	150	29.259	272	67.50	33	18.444	289	59.58	110	20.241	280	47.93
26.8	25.12	65	53.82	90	29.545	286	67.03	47	18.755	311	59.00	58	20.537	296	47.34
Oct. 6.8	25.80	68	53.54	28	29.842	297	66.43	60	19.080	325	58.99	1	20.845	308	46.65
16.7	26.50	70	53.94	40	30.150	308	65.68	75	19.413	333	59.56	57	21.161	316	45.91
26.7	27.18	68	54.99	105	30.460	310	64.83	85	19.749	336	60.71	115	21.482	321	45.11
Nov. 5.7	27.83	65	56.68	169	30.769	309	63.89	94	20.079	330	62.41	170	21.803	321	44.28
15.7	28.43	60	58.96	228	31.071	302	62.91	98	20.394	315	64.61	220	22.117	314	43.45
25.6	28.96	53	61.76	280	31.360	289	61.91	100	20.686	292	67.23	262	22.415	298	42.67
Dec. 5.6	29.40	44	64.98	322	31.626	266	60.95	96	20.946	260	70.19	296	22.693	278	41.97
15.6	29.71	31	68.52	354	31.863	237	60.06	89	21.165	219	73.38	319	22.940	247	41.37
25.5	29.92	21	72.25	373	32.062	199	59.29	77	21.337	172	76.70	332	23.148	208	40.90
35.5	30.00	8	76.05	380	32.218	156	58.63	66	21.456	119	80.05	335	23.312	164	40.58
Mean Place	26.276		63.50		26.372		75.10		16.918		65.73		17.258		57.40
Sec δ, Tan δ	2.977		−2.804		1.044		+0.300		1.251		−0.752		1.080		+0.40
$D_\psi \alpha$, $D_\omega \alpha$	−0.01		−0.06		+0.07		+0.01		+0.04		−0.02		+0.07		+0.01
$D_\psi \delta$, $D_\omega \delta$	−0.1		+1.0		−0.1		+0.9		−0.1		+0.9		−0.1		+0.9

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Volantis. Mag. 4.0 Right Ascension.		δ Volantis. Declination.		ι Geminorum. Mag. 3.9 Right Ascension.		ι Geminorum. Declination.		η Canis Majoris. Mag. 2.4 Right Ascension.		η Canis Majoris. Declination.		Groombridge 1308. Mag. 5.8 Right Ascension.		Groombridge 1308. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	7 16		−67 48		7 20		+27 57		7 20		−29 8		7 22		+68 37	
	s		″		s		″		s		″		s		″	
Jan. 0.5	56.64	4	35.09	383	44.625	149	28.27	10	55.888	100	44.20	306	33.63	26	48.85	237
10.5	56.68	9	38.92	375	44.774	91	28.37	26	55.988	46	47.26	291	33.89	14	51.22	249
20.5	56.59	20	42.67	355	44.865	35	28.63	38	56.034	8	50.20	273	34.03	1	53.71	250
30.4	56.39	30	46.22	327	44.900	20	29.01	47	56.026	60	52.93	245	34.04	12	56.21	243
Feb. 9.4	56.09	39	49.49	290	44.880	72	29.48	52	55.966	108	55.38	212	33.92	23	58.64	223
19.4	55.70	46	52.39	248	44.808	117	30.00	52	55.858	149	57.50	176	33.69	34	60.87	196
Mar. 1.4	55.24	54	54.87	202	44.691	154	30.52	49	55.709	180	59.26	139	33.35	41	62.83	159
11.3	54.70	57	56.89	151	44.537	177	31.01	41	55.529	203	60.65	98	32.94	48	64.42	118
21.3	54.13	59	58.40	99	44.360	192	31.42	32	55.326	217	61.63	57	32.46	52	65.60	70
31.3	53.54	60	59.39	44	44.168	194	31.74	20	55.109	217	62.20	16	31.94	53	66.30	22
Apr. 10.3	52.94	60	59.83	9	43.974	186	31.94	8	54.892	210	62.36	25	31.41	51	66.52	28
20.2	52.34	57	59.74	62	43.788	166	32.02	3	54.682	195	62.11	64	30.90	48	66.24	75
30.2	51.77	51	59.12	112	43.622	140	31.99	15	54.487	170	61.47	101	30.42	42	65.49	120
May 10.2	51.26	48	58.00	160	43.482	107	31.84	26	54.317	143	60.46	134	30.00	35	64.29	159
20.1	50.78	40	56.40	204	43.375	68	31.58	34	54.174	107	59.12	167	29.65	26	62.70	192
30.1	50.38	34	54.36	243	43.307	29	31.24	40	54.067	70	57.45	194	29.39	16	60.78	221
June 9.1	50.04	24	51.93	274	43.278	12	30.84	45	53.997	32	55.51	217	29.23	8	58.57	242
19.1	49.80	16	49.19	299	43.290	53	30.39	49	53.965	8	53.34	232	29.15	3	56.15	256
29.0	49.64	6	46.20	314	43.343	91	29.90	52	53.973	48	51.02	243	29.18	13	53.59	264
July 9.0	49.58	3	43.06	323	43.434	130	29.38	54	54.021	86	48.59	245	29.31	23	50.95	266
19.0	49.61	13	39.83	320	43.564	164	28.84	56	54.107	123	46.14	241	29.54	31	48.29	261
29.0	49.74	22	36.63	306	43.728	194	28.28	59	54.230	157	43.73	228	29.85	39	45.68	252
Aug. 7.9	49.96	31	33.57	284	43.922	224	27.69	61	54.387	189	41.45	206	30.24	48	43.16	237
17.9	50.27	40	30.73	250	44.146	249	27.08	63	54.576	219	39.39	176	30.72	54	40.79	218
27.9	50.67	47	28.23	207	44.395	270	26.45	68	54.795	246	37.63	141	31.26	60	38.61	196
Sept. 6.8	51.14	52	26.16	157	44.665	290	25.77	72	55.041	268	36.22	97	31.86	65	36.65	168
16.8	51.66	58	24.59	97	44.955	308	25.05	74	55.309	288	35.25	49	32.51	70	34.97	139
26.8	52.24	62	23.62	35	45.263	320	24.31	78	55.597	304	34.76	5	33.21	73	33.58	105
Oct. 6.8	52.86	62	23.27	32	45.583	330	23.53	79	55.901	313	34.81	58	33.94	74	32.53	68
16.7	53.48	62	23.59	99	45.913	336	22.74	78	56.214	316	35.39	110	34.68	75	31.85	30
26.7	54.10	60	24.58	162	46.249	336	21.96	75	56.530	313	36.49	161	35.43	74	31.55	10
Nov. 5.7	54.70	56	26.20	223	46.585	330	21.21	67	56.843	302	38.10	207	36.17	72	31.65	51
15.7	55.26	49	28.43	275	46.915	316	20.54	59	57.145	284	40.17	246	36.89	67	32.16	92
25.6	55.75	41	31.18	317	47.231	294	19.95	47	57.429	257	42.63	275	37.56	62	33.08	133
Dec. 5.6	56.16	32	34.35	352	47.525	262	19.48	31	57.686	221	45.38	297	38.18	55	34.41	170
15.6	56.48	22	37.87	372	47.787	223	19.17	15	57.907	179	48.35	309	38.73	44	36.11	202
25.5	56.70	10	41.59	382	48.010	176	19.02	3	58.086	130	51.44	308	39.17	34	38.13	226
35.5	56.80		45.41		48.186		19.05		58.216		54.52		39.51		40.39	
Mean Place	52.918		32.55		41.898		36.81		53.518		39.45		28.056		58.70	
Sec δ, Tan δ	2.648		−2.452		1.132		+0.531		1.145		−0.558		2.744		+2.556	
$D_\psi \alpha$, $D_\omega \alpha$	0.00		−0.05		+0.07		+0.01		+0.05		−0.01		+0.13		+0.06	
$D_\psi \delta$, $D_\omega \delta$	−0.1		+0.9		−0.1		+0.9		−0.1		+0.9		−0.1		+0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Geminorum. (Pollux.) Mag. 1.2				4 Puppis. Mag. 5.1				ξ Argus. Mag. 3.5				φ Geminorum. Mag. 5.0			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	7 40		+28 13		7 42		−14 21		7 45		−24 39		7 48		+26 56	
	s		″		s		″		s		″		s		″	
Jan. 0.5	24.405		12.75		15.391		63.70		55.581		25.13		35.222		25.66	
10.5	24.573	168	12.79	4	15.524	133	66.16	246	55.713	132	28.07	294	35.398	176	25.59	7
20.5	24.685	112	13.03	24	15.608	84	68.48	232	55.792	79	30.89	282	35.520	122	25.72	13
30.5	24.741	56	13.41	38	15.641	33	70.61	213	55.818	26	33.53	264	35.585	65	26.03	31
Feb. 9.4	24.738	3	13.91	50	15.624	17	72.51	190	55.791	27	35.93	240	35.594	9	26.45	42
19.4	24.683	55	14.48	57	15.560	64	74.14	163	55.716	75	38.03	210	35.549	45	26.97	52
Mar. 1.4	24.581	102	15.08	60	15.455	105	75.49	135	55.598	118	39.81	178	35.456	93	27.54	57
11.4	24.440	141	15.66	58	15.317	138	76.53	104	55.445	153	41.24	143	35.323	133	28.11	57
21.3	24.270	170	16.19	53	15.154	163	77.27	74	55.267	178	42.29	105	35.160	163	28.64	53
31.3	24.083	187	16.63	44	14.977	177	77.71	44	55.073	194	42.97	68	34.980	180	29.10	46
Apr. 10.3	23.889	194	16.95	32	14.795	182	77.85	14	54.873	200	43.27	30	34.792	188	29.46	36
20.2	23.701	188	17.14	19	14.617	178	77.69	16	54.676	197	43.21	6	34.607	185	29.70	24
30.2	23.529	172	17.20	6	14.452	165	77.26	43	54.491	185	42.79	42	34.437	170	29.83	13
May 10.2	23.379	150	17.14	6	14.305	147	76.56	70	54.325	166	42.01	78	34.287	150	29.83	0
20.2	23.259	120	16.95	19	14.185	120	75.61	95	54.184	141	40.91	110	34.166	121	29.73	10
30.1	23.175	84	16.67	28	14.093	92	74.43	118	54.073	111	39.52	139	34.078	88	29.51	22
June 9.1	23.127	48	16.29	38	14.034	59	73.05	138	53.995	78	37.85	167	34.026	52	29.20	31
19.1	23.120	7	15.84	45	14.009	25	71.51	154	53.951	44	35.97	188	34.013	13	28.82	38
29.1	23.152	32	15.33	51	14.018	9	69.84	167	53.944	7	33.91	206	34.038	25	28.38	44
July 9.0	23.223	71	14.77	56	14.061	43	68.09	175	53.973	29	31.74	217	34.102	64	27.89	49
19.0	23.330	107	14.16	61	14.138	77	66.32	177	54.038	65	29.53	221	34.200	98	27.33	56
29.0	23.472	142	13.51	65	14.248	110	64.59	173	54.136	98	27.34	219	34.334	134	26.73	60
Aug. 7.9	23.647	175	12.81	70	14.387	139	62.97	162	54.269	133	25.25	209	34.500	166	26.08	65
17.9	23.851	204	12.08	73	14.555	168	61.49	148	54.434	165	23.33	192	34.694	194	25.37	71
27.9	24.081	230	11.31	77	14.749	194	60.26	123	54.628	194	21.67	166	34.917	223	24.61	76
Sept. 6.9	24.337	256	10.50	81	14.969	220	59.30	96	54.851	223	20.33	134	35.165	248	23.80	81
16.8	24.614	277	9.63	87	15.210	241	58.69	61	55.099	248	19.37	96	35.434	269	22.92	88
26.8	24.911	297	8.73	90	15.471	261	58.47	22	55.368	269	18.87	50	35.724	290	21.99	93
Oct. 6.8	25.224	313	7.79	94	15.748	277	58.66	19	55.655	287	18.85	2	36.032	308	21.01	98
16.8	25.551	327	6.84	95	16.038	290	59.28	62	55.958	303	19.32	47	36.354	322	20.01	100
26.7	25.887	336	5.90	94	16.336	298	60.31	103	56.268	310	20.31	99	36.687	333	18.99	102
Nov. 5.7	26.227	340	4.99	91	16.637	301	61.73	142	56.581	313	21.78	147	37.025	338	17.99	100
15.7	26.563	336	4.15	84	16.934	297	63.52	179	56.888	307	23.67	189	37.361	336	17.06	93
25.6	26.889	326	3.43	72	17.219	285	65.60	208	57.183	295	25.95	228	37.689	328	16.22	84
Dec. 5.6	27.197	308	2.83	60	17.484	265	67.90	230	57.457	274	28.54	259	37.999	310	15.51	71
15.6	27.475	278	2.40	43	17.723	239	70.34	244	57.700	243	31.33	279	38.283	284	14.96	55
25.6	27.715	240	2.17	23	17.925	202	72.85	251	57.904	204	34.25	292	38.530	247	14.60	36
35.5	27.911	196	2.12	5	18.085	160	75.33	248	58.064	160	37.19	294	38.733	203	14.45	15
Mean Place	21.720		22.53		13.000		57.88		53.258		20.43		32.587		35.82	
Sec δ, Tan δ	1.135		+0.537		1.032		−0.256		1.100		−0.459		1.122		+0.509	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.07		+0.02		+0.05		−0.01		+0.05		−0.01		+0.07		+0.02	
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.2		+0.9		−0.2		+0.9		−0.2		+0.9		−0.2		+0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	χ Geminorum. Mag. 5.0 Right Ascension.		Declination.		27 Lyncis. Mag. 4.9 Right Ascension.		Declination.	
	h m 7 58		° ′ +28 0		h m 8 2		° ′ +51 44	
	s		″		s		″	
Jan. 0.6	35.445		69.84		25.878		16.34	
10.5	35.631	186	69.81	3	26.126	248	17.68	134
20.5	35.765	134	69.99	18	26.299	173	19.25	157
30.5	35.841	76	70.33	34	26.393	94	20.97	172
Feb. 9.5	35.860	19	70.82	49	26.408	15	22.77	180
19.4	35.824	36	71.41	59	26.347	61	24.57	180
Mar. 1.4	35.738	86	72.05	64	26.216	131	26.27	170
11.4	35.611	127	72.70	65	26.027	189	27.80	153
21.3	35.453	158	73.31	61	25.793	234	29.09	129
31.3	35.275	178	73.84	53	25.526	267	30.10	101
Apr. 10.3	35.088	187	74.27	43	25.243	283	30.77	67
20.3	34.902	186	74.57	30	24.960	283	31.07	30
30.2	34.727	175	74.73	16	24.689	271	31.03	4
May 10.2	34.573	154	74.77	4	24.445	244	30.63	40
20.2	34.446	127	74.68	9	24.236	209	29.89	74
30.2	34.350	96	74.45	23	24.070	166	28.84	105
June 9.1	34.290	60	74.13	32	23.954	116	27.54	130
19.1	34.268	22	73.72	41	23.891	63	26.01	153
29.1	34.283	15	73.22	50	23.882	9	24.29	172
July 9.0	34.336	53	72.65	57	23.928	46	22.44	185
19.0	34.425	89	72.02	63	24.027	99	20.48	196
29.0	34.549	124	71.32	70	24.179	152	18.47	201
Aug. 8.0	34.705	156	70.57	75	24.378	199	16.43	204
17.9	34.891	186	69.76	81	24.622	244	14.41	202
27.9	35.106	215	68.90	86	24.909	287	12.43	198
Sept. 6.9	35.346	240	67.97	93	25.234	325	10.53	190
16.8	35.612	266	66.99	98	25.595	361	8.73	180
26.8	35.899	287	65.94	105	25.987	392	7.08	165
Oct. 6.8	36.206	307	64.87	107	26.406	419	5.60	148
16.8	36.528	322	63.77	110	26.848	442	4.32	128
26.7	36.863	335	62.68	109	27.306	458	3.28	104
Nov. 5.7	37.205	342	61.61	107	27.772	466	2.52	76
15.7	37.547	342	60.62	99	28.237	465	2.05	47
25.7	37.882	335	59.74	88	28.690	453	1.91	14
Dec. 5.6	38.201	310	59.01	73	29.122	432	2.12	21
15.6	38.494	293	58.45	56	29.517	395	2.68	56
25.6	38.752	258	58.09	36	29.863	346	3.55	87
35.5	38.967	215	57.95	14	30.148	285	4.75	120
Mean Place	32.819		80.69		22.454		29.40	
Sec δ, Tan δ	1.133		+0.532		1.615		+1.268	
Dψa, Dωa	+0.07		+0.02		+0.09		+0.04	
Dψδ, Dωδ	−0.2		+0.9		−0.2		+0.9	

Washington Mean Time.	ρ Argus. Mag. 2.9 Right Ascension.		Declination.		8 H. Ursæ Majoris. Mag. 5.5 Right Ascension.		Declination.	
	h m 8 4		° ′ −24 4		h m 8 4		° ′ +68 42	
	s		″		s		″	
Jan. 0.6	7.942		16.22		51.45		37.09	
10.5	8.093	151	19.15	293	51.82	37	39.25	216
20.5	8.192	99	22.00	285	52.06	24	41.63	238
30.5	8.237	45	24.68	268	52.19	13	44.15	252
Feb. 9.5	8.231	6	27.12	244	52.18	1	46.70	255
19.4	8.174	57	29.29	217	52.04	14	49.17	247
Mar. 1.4	8.074	100	31.15	186	51.78	26	51.46	229
11.4	7.937	137	32.66	151	51.44	34	53.47	201
21.3	7.771	166	33.82	116	51.01	43	55.12	165
31.3	7.587	184	34.62	80	50.53	48	56.34	122
Apr. 10.3	7.394	193	35.05	43	50.01	52	57.09	75
20.3	7.202	192	35.10	5	49.50	51	57.35	26
30.2	7.018	184	34.80	30	48.99	51	57.12	23
May 10.2	6.851	167	34.16	64	48.52	47	56.41	71
20.2	6.704	147	33.20	96	48.11	41	55.24	117
30.2	6.586	118	31.93	127	47.76	35	53.67	157
June 9.1	6.496	90	30.38	155	47.50	26	51.75	192
19.1	6.440	56	28.62	176	47.34	16	49.52	223
29.1	6.419	21	26.68	194	47.26	8	47.07	245
July 9.0	6.431	12	24.60	208	47.27	1	44.44	263
19.0	6.478	47	22.46	214	47.38	11	41.70	274
29.0	6.560	82	20.34	212	47.59	21	38.91	279
Aug. 8.0	6.675	115	18.28	206	47.88	29	36.13	278
17.9	6.822	147	16.38	190	48.25	37	33.41	272
27.9	7.000	178	14.72	166	48.69	44	30.82	259
Sept. 6.9	7.207	207	13.35	137	49.21	52	28.38	244
16.8	7.441	234	12.36	99	49.79	58	26.17	221
26.8	7.701	260	11.79	57	50.42	63	24.20	197
Oct. 6.8	7.981	280	11.69	10	51.10	68	22.55	165
16.8	8.279	298	12.08	39	51.82	72	21.23	132
26.7	8.589	310	12.98	90	52.56	74	20.27	96
Nov. 5.7	8.905	316	14.35	137	53.32	76	19.74	53
15.7	9.219	314	16.17	182	54.07	75	19.64	10
25.7	9.522	303	18.37	220	54.79	72	19.99	35
Dec. 5.6	9.808	286	20.88	251	55.47	68	20.79	80
15.6	10.066	258	23.62	274	56.08	61	22.03	124
25.6	10.287	221	26.51	299	56.61	53	23.67	164
35.5	10.466	179	29.43	292	57.05	44	25.67	200
Mean Place	5.646		11.74		46.259		51.13	
Sec δ, Tan δ	1.095		−0.447		2.754		+2.566	
Dψa, Dωa	+0.05		−0.02		+0.12		+0.09	
Dψδ, Dωδ	−0.2		+0.9		−0.2		+0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Argus. Mag. 2.2 Right Ascension.		γ Argus. Declination.		ζ Cancri (*mean*). Mag. 4.7 Right Ascension.		ζ Cancri Declination.		Bradley 1147. Mag. 5.7 Right Ascension.		Bradley 1147. Declination.		20 Puppis. Mag. 5.0 Right Ascension.		20 Puppis. Declination.	
	h m 8 7		° ′ −47 5		h m 8 7		° ′ +17 53		h m 8 9		° ′ +75 59		h m 8 9		° ′ −15 32	
	s		″		s		″		s		″		s		″	
Jan. 0.6	4.840		52.44		36.565		25.16		31.55		67.10		38.846		41.66	
10.5	4.992	152	56.11	367	36.749	184	24.47	69	32.07	52	69.52	242	39.007	161	44.21	255
20.5	5.077	85	59.75	364	36.882	133	23.97	50	32.42	35	72.19	267	39.118	111	46.67	246
30.5	5.094	17	63.26	351	36.962	80	23.67	30	32.57	15	74.97	278	39.178	60	48.95	228
Feb. 9.5	5.045	49	66.57	331	36.989	27	23.54	13	32.54	3	77.78	281	39.186	8	51.00	205
19.4	4.935	110	69.59	302	36.964	25	23.57	3	32.32	22	80.49	271	39.146	40	52.80	180
Mar. 1.4	4.770	165	72.25	266	36.893	71	23.72	15	31.93	39	82.99	250	39.063	83	54.31	151
11.4	4.559	211	74.52	227	36.783	110	23.98	26	31.39	54	85.18	219	38.943	120	55.52	121
21.3	4.312	247	76.35	183	36.643	140	24.28	30	30.74	65	86.96	178	38.796	147	56.43	91
31.3	4.042	270	77.71	136	36.482	161	24.61	33	30.00	74	88.27	131	38.629	167	57.02	59
Apr. 10.3	3.759	283	78.59	88	36.312	170	24.94	33	29.20	80	89.09	82	38.454	175	57.31	29
20.3	3.473	286	78.97	38	36.143	169	25.25	31	28.39	81	89.36	27	38.278	176	57.31	0
30.2	3.194	279	78.87	10	35.983	160	25.53	28	27.60	79	89.09	27	38.111	167	57.01	30
May 10.2	2.933	261	78.28	59	35.839	144	25.75	22	26.86	74	88.29	80	37.958	153	56.44	57
20.2	2.695	238	77.23	105	35.720	119	25.95	20	26.19	67	87.00	129	37.826	132	55.60	84
30.2	2.489	206	75.75	148	35.628	92	26.11	16	25.62	57	85.27	173	37.720	106	54.52	108
June 9.1	2.319	170	73.89	186	35.568	60	26.24	13	25.17	45	83.14	213	37.643	77	53.24	128
19.1	2.190	129	71.67	222	35.542	26	26.31	7	24.85	32	80.69	245	37.596	47	51.78	146
29.1	2.105	85	69.17	250	35.550	8	26.35	4	24.67	18	77.99	270	37.582	14	50.16	162
July 9.0	2.068	37	66.46	271	35.591	41	26.34	1	24.63	4	75.11	288	37.600	18	48.46	170
19.0	2.077	9	63.62	284	35.666	75	26.28	6	24.74	11	72.08	303	37.650	50	46.71	175
29.0	2.135	58	60.72	290	35.773	107	26.16	12	24.98	24	69.02	306	37.733	83	44.98	173
Aug. 8.0	2.241	106	57.88	284	35.909	136	25.96	20	25.35	37	65.97	305	37.846	113	43.34	164
17.9	2.394	153	55.18	270	36.074	165	25.68	28	25.86	51	62.99	298	37.988	142	41.83	151
27.9	2.594	200	52.73	245	36.265	191	25.28	40	26.49	63	60.16	283	38.160	172	40.54	129
Sept. 6.9	2.838	244	50.61	212	36.482	217	24.77	51	27.23	74	57.52	264	38.359	199	39.51	103
16.9	3.120	282	48.91	170	36.721	239	24.12	65	28.06	83	55.11	241	38.583	224	38.81	70
26.8	3.440	320	47.74	117	36.983	262	23.33	79	28.98	92	53.01	210	38.832	249	38.49	32
Oct. 6.8	3.790	350	47.12	62	37.264	281	22.41	92	29.98	100	51.25	176	39.100	268	38.58	9
16.8	4.161	371	47.11	1	37.563	299	21.36	105	31.02	104	49.87	138	39.386	286	39.11	53
26.7	4.547	386	47.72	61	37.874	311	20.19	117	32.10	108	48.92	95	39.684	298	40.05	94
Nov. 5.7	4.938	391	48.95	123	38.193	319	18.96	123	33.19	109	48.43	49	39.991	307	41.41	136
15.7	5.323	385	50.77	182	38.515	322	17.69	127	34.27	108	48.42	1	40.298	307	43.15	174
25.7	5.690	367	53.14	237	38.831	316	16.42	127	35.32	105	48.91	49	40.597	299	45.21	206
Dec. 5.6	6.028	338	55.94	280	39.133	302	15.22	120	36.30	98	49.89	98	40.881	284	47.51	230
15.6	6.326	298	59.13	319	39.414	281	14.11	111	37.19	89	51.34	145	41.140	259	49.99	248
25.6	6.573	247	62.58	345	39.662	248	13.15	96	37.96	77	53.21	187	41.366	226	52.57	258
35.6	6.762	189	66.19	361	39.871	209	12.35	80	38.58	62	55.45	224	41.553	187	55.13	256
Mean Place	2.246		50.89		34.130		35.32		24.306		81.71		36.588		36.06	
Sec δ, Tan δ	1.469		−1.076		1.051		+0.323		4.135		+4.012		1.038		−0.278	
$D_\psi a$, $D_\omega a$	+0.04		−0.04		+0.07		+0.01		+0.15		+0.14		+0.05		−0.01	
$D_\psi \delta$, $D_\omega \delta$	−0.2		+0.9		−0.2		+0.8		−0.2		+0.8		−0.2		+0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Cancri. Mag. 3.8				31 Lyncis. Mag. 4.4			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 8 12		° ' + 9 25		h m 8 17		° ' +43 26	
	s		"		s		"	
Jan. 0.6	9.763	179	60.77	121	20.856	238	43.32	80
10.5	9.942	130	59.56	104	21.094	177	44.12	104
20.5	10.072	80	58.52	85	21.271	109	45.16	125
30.5	10.152	27	57.67	63	21.380	38	46.41	137
Feb. 9.5	10.179	22	57.04	46	21.418	27	47.78	144
19.4	10.157	67	56.58	26	21.391	88	49.22	142
Mar. 1.4	10.090	104	56.32	13	21.303	141	50.64	135
11.4	9.986	134	56.19	0	21.162	184	51.99	119
21.4	9.852	152	56.19	11	20.978	213	53.18	99
31.3	9.700	163	56.30	19	20.765	229	54.17	73
Apr. 10.3	9.537	163	56.49	27	20.536	233	54.90	47
20.3	9.374	155	56.76	32	20.303	224	55.37	18
30.2	9.219	139	57.08	36	20.079	205	55.55	12
May 10.2	9.080	117	57.44	40	19.874	177	55.43	38
20.2	8.963	92	57.84	42	19.697	143	55.05	66
30.2	8.871	61	58.26	45	19.554	102	54.39	90
June 9.1	8.810	30	58.71	47	19.452	60	53.49	109
19.1	8.780	1	59.18	47	19.392	15	52.40	127
29.1	8.781	35	59.65	46	19.377	31	51.13	142
July 9.1	8.816	66	60.11	43	19.408	74	49.71	153
19.0	8.882	95	60.54	37	19.482	116	48.18	162
29.0	8.977	125	60.91	29	19.598	158	46.56	168
Aug. 8.0	9.102	152	61.20	17	19.756	196	44.88	171
17.9	9.254	179	61.37	4	19.952	232	43.17	172
27.9	9.433	204	61.41	13	20.184	268	41.45	172
Sept. 6.9	9.637	226	61.28	33	20.452	298	39.73	168
16.9	9.863	250	60.95	52	20.750	327	38.05	160
26.8	10.113	269	60.43	75	21.077	354	36.45	154
Oct. 6.8	10.382	286	59.68	94	21.431	376	34.91	141
16.8	10.668	299	58.74	115	21.807	394	33.50	125
26.8	10.967	309	57.59	131	22.201	405	32.25	107
Nov. 5.7	11.276	311	56.28	143	22.606	409	31.18	84
15.7	11.587	306	54.85	152	23.015	402	30.34	57
25.7	11.893	294	53.33	154	23.417	387	29.77	28
Dec. 5.6	12.187	272	51.79	151	23.804	359	29.49	2
15.6	12.459	241	50.28	142	24.163	321	29.51	34
25.6	12.700	202	48.86	130	24.484	271	29.85	65
35.6	12.902		47.56		24.755		30.50	
Mean Place	7.426		69.98		17.895		56.90	
Sec δ, Tan δ	1.014		+0.166		1.377		+0.947	
$D_\psi a$, $D_\omega a$	+0.06		+0.01		+0.08		+0.04	
$D_\psi \delta$, $D_\omega \delta$	−0.2		+0.8		−0.2		+0.8	

Washington Mean Time.	d^1 Cancri. Mag. 5.9				ε Argus. Mag. 1.7			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 8 18		° ' +18 35		h m 8 20		° ' −59 14	
	s		"		s		"	
Jan. 0.6	46.103	194	24.72	69	54.204	185	54.24	382
10.5	46.297	145	24.03	49	54.389	98	58.06	386
20.5	46.442	91	23.54	28	54.487	11	61.92	380
30.5	46.533	38	23.26	9	54.498	72	65.72	363
Feb. 9.5	46.571	15	23.17	7	54.426	153	69.35	338
19.4	46.556	62	23.24	22	54.273	222	72.73	306
Mar. 1.4	46.494	102	23.46	30	54.051	284	75.79	266
11.4	46.392	133	23.76	36	53.767	331	78.45	224
21.4	46.259	155	24.12	38	53.436	368	80.69	175
31.3	46.104	169	24.50	39	53.068	388	82.44	126
Apr. 10.3	45.935	169	24.89	36	52.680	398	83.70	74
20.3	45.766	161	25.25	32	52.282	395	84.44	21
30.2	45.605	147	25.57	27	51.887	381	84.65	31
May 10.2	45.458	124	25.84	20	51.506	354	84.34	82
20.2	45.334	98	26.04	16	51.152	321	83.52	130
30.2	45.236	67	26.20	11	50.831	279	82.22	176
June 9.1	45.169	35	26.31	5	50.552	230	80.46	216
19.1	45.134	3	26.36	0	50.322	175	78.30	251
29.1	45.131	32	26.36	5	50.147	115	75.79	276
July 9.1	45.163	64	26.31	11	50.032	50	73.03	296
19.0	45.227	95	26.20	19	49.982	14	70.07	308
29.0	45.322	126	26.01	27	49.996	81	66.99	306
Aug. 8.0	45.448	155	25.74	36	50.077	150	63.93	296
17.9	45.603	181	25.38	47	50.227	215	60.97	277
27.9	45.784	208	24.91	59	50.442	279	58.20	246
Sept. 6.9	45.992	232	24.32	74	50.721	337	55.74	205
16.9	46.224	256	23.58	86	51.058	390	53.69	155
26.8	46.480	276	22.72	99	51.448	433	52.14	98
Oct. 6.8	46.756	295	21.73	113	51.881	467	51.16	37
16.8	47.051	311	20.60	122	52.348	489	50.79	27
26.8	47.362	320	19.38	129	52.837	496	51.06	98
Nov. 5.7	47.682	324	18.09	132	53.333	488	52.04	158
15.7	48.006	321	16.77	131	53.821	466	53.62	217
25.7	48.327	310	15.46	124	54.287	427	55.79	273
Dec. 5.6	48.637	288	14.22	113	54.714	374	58.52	315
15.6	48.925	258	13.09	98	55.088	310	61.67	349
25.6	49.183	219	12.11	80	55.398	233	65.16	351
35.6	49.402		11.31		55.631		68.67	
Mean Place	43.693		35.44		51.181		54.66	
Sec δ, Tan δ	1.055		+0.336		1.956		−1.681	
$D_\psi a$, $D_\omega a$	+0.07		+0.01		+0.02		−0.06	
$D_\psi \delta$, $D_\omega \delta$	−0.2		+0.8		−0.2		+0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 Monocerotis. Mag. 4.0				θ Chamæleontis. Mag. 4.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 8 21		° ′ − 3 38		h m 8 22		° ′ −77 13	
	s		″		s		″	
Jan. 0.6	39.108	177	36.12	198	71.12	27	23.62	377
10.5	39.285	131	38.10	184	71.39	9	27.39	387
20.5	39.416	81	39.94	165	71.48	10	31.26	386
30.5	39.497	29	41.59	144	71.38	29	35.12	375
Feb. 9.5	39.526	19	43.03	120	71.09	44	38.87	354
19.4	39.507	63	44.23	97	70.65	62	42.41	325
Mar. 1.4	39.444	99	45.20	73	70.03	73	45.66	290
11.4	39.345	130	45.93	50	69.30	84	48.56	248
21.4	39.215	149	46.43	28	68.46	92	51.04	203
31.3	39.066	160	46.71	8	67.54	98	53.07	155
Apr. 10.3	38.906	162	46.79	11	66.56	100	54.62	102
20.3	38.744	156	46.68	31	65.56	101	55.64	49
30.2	38.588	143	46.37	46	64.55	100	56.13	5
May 10.2	38.445	122	45.91	62	63.55	95	56.08	57
20.2	38.323	99	45.29	78	62.60	88	55.51	109
30.2	38.224	71	44.51	89	61.72	80	54.42	156
June 9.1	38.153	44	43.62	99	60.92	68	52.86	201
19.1	38.109	12	42.63	107	60.24	57	50.85	238
29.1	38.097	19	41.56	112	59.67	43	48.47	271
July 9.1	38.116	49	40.44	112	59.24	26	45.76	294
19.0	38.165	79	39.32	109	58.98	12	42.82	310
29.0	38.244	108	38.23	101	58.86	5	39.72	314
Aug. 8.0	38.352	135	37.22	88	58.91	23	36.58	308
17.9	38.487	163	36.34	70	59.14	39	33.50	293
27.9	38.650	189	35.64	49	59.53	54	30.57	265
Sept. 6.9	38.839	215	35.15	21	60.07	70	27.92	227
16.9	39.054	237	34.94	8	60.77	81	25.65	181
26.8	39.291	259	35.02	40	61.58	92	23.84	127
Oct. 6.8	39.550	277	35.42	73	62.50	99	22.57	65
16.8	39.827	292	36.15	106	63.49	104	21.92	1
26.8	40.119	303	37.21	135	64.53	104	21.93	66
Nov. 5.7	40.422	306	38.56	162	65.57	102	22.59	133
15.7	40.728	301	40.18	183	66.59	95	23.92	195
25.7	41.029	290	42.01	198	67.54	85	25.87	250
Dec. 5.6	41.319	268	43.99	207	68.39	71	28.37	298
15.6	41.587	240	46.06	208	69.10	57	31.35	336
25.6	41.827	201	48.14	202	69.67	39	34.71	364
35.6	42.028		50.16		70.06		38.35	
Mean Place	36.867		28.68		65.617		25.62	
Sec δ, Tan δ	1.002		−0.064		4.523		−4.411	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		0.00		−0.03		−0.17	
$D_\psi\delta$, $D_\omega\delta$	−0.2		+0.8		−0.2		+0.8	

Washington Mean Time.	o Ursæ Majoris. Mag. 3.5				Groombridge 1450. Mag. 6.0			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 8 23		° ′ +60 58		h m 8 27		° ′ +38 17	
	s		″		s		″	
Jan. 0.6	36.91	33	69.66	168	42.096	236	29.04	42
10.5	37.24	23	71.34	195	42.332	179	29.46	71
20.5	37.47	15	73.29	216	42.511	117	30.17	91
30.5	37.62	4	75.45	226	42.628	51	31.08	108
Feb. 9.5	37.66	5	77.71	225	42.679	10	32.16	120
19.4	37.61	15	79.96	215	42.669	69	33.36	122
Mar. 1.4	37.46	22	82.11	197	42.600	119	34.58	118
11.4	37.24	29	84.08	169	42.481	159	35.76	110
21.4	36.95	33	85.77	134	42.322	188	36.86	96
31.3	36.62	37	87.11	96	42.134	205	37.82	75
Apr. 10.3	36.25	37	88.07	52	41.929	210	38.57	54
20.3	35.88	36	88.59	8	41.719	205	39.11	30
30.2	35.52	35	88.67	35	41.514	188	39.41	5
May 10.2	35.17	31	88.32	78	41.326	164	39.46	19
20.2	34.86	26	87.54	117	41.162	133	39.27	42
30.2	34.60	20	86.37	151	41.029	99	38.85	64
June 9.1	34.40	12	84.86	181	40.930	60	38.21	82
19.1	34.28	7	83.05	207	40.870	21	37.39	98
29.1	34.21	1	80.98	226	40.849	20	36.41	114
July 9.1	34.20	6	78.72	241	40.869	60	35.27	126
19.0	34.26	13	76.31	251	40.929	98	34.01	135
29.0	34.39	19	73.80	255	41.027	136	32.66	143
Aug. 8.0	34.58	26	71.25	254	41.163	172	31.23	150
17.9	34.84	31	68.71	250	41.335	206	29.73	154
27.9	35.15	37	66.21	241	41.541	237	28.19	157
Sept. 6.9	35.52	42	63.80	226	41.778	268	26.62	158
16.9	35.94	46	61.54	208	42.046	297	25.04	157
26.8	36.40	50	59.46	186	42.343	322	23.47	154
Oct. 6.8	36.90	53	57.60	159	42.665	346	21.93	147
16.8	37.43	56	56.01	127	43.011	364	20.46	137
26.8	37.99	57	54.74	94	43.375	377	19.09	123
Nov. 5.7	38.56	58	53.80	54	43.752	384	17.86	105
15.7	39.14	57	53.26	13	44.136	380	16.81	84
25.7	39.71	55	53.13	29	44.516	369	15.97	58
Dec. 5.6	40.26	50	53.42	72	44.885	344	15.39	30
15.6	40.76	45	54.14	113	45.229	310	15.09	2
25.6	41.21	38	55.27	150	45.539	265	15.07	29
35.6	41.59		56.77		45.804		15.36	
Mean Place	32.950		85.06		39.352		42.76	
Sec δ, Tan δ	2.062		+1.803		1.274		+0.790	
$D_\psi\alpha$, $D_\omega\alpha$	+0.10		+0.07		+0.08		+0.03	
$D_\psi\delta$, $D_\omega\delta$	−0.2		+0.8		−0.2		+0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	η Cancri. Mag. 5.5 Right Ascension.		η Cancri. Declination.		Groombridge 1446. Mag. 6.3 Right Ascension.		Groombridge 1446. Declination.		δ Hydræ. Mag. 4.2 Right Ascension.		δ Hydræ. Declination.		σ Hydræ. Mag. 4.5 Right Ascension.		σ Hydræ. Declination.	
	h m 8 28		° ′ +20 42		h m 8 30		° ′ +73 54		h m 8 33		° ′ + 5 58		h m 8 34		° ′ + 3 37	
	s		″		s		″		s		″		s		″	
Jan. 0.6	4.061	206	50.47	60	50.26	54	35.23	217	24.426	195	64.20	149	33.752	195	27.30	161
10.6	4.267	156	49.87	39	50.80	38	37.40	249	24.621	148	62.71	131	33.947	148	25.69	145
20.5	4.423	103	49.48	16	51.18	21	39.89	267	24.769	99	61.40	109	34.095	98	24.24	125
30.5	4.526	46	49.32	3	51.39	5	42.56	275	24.868	47	60.31	89	34.193	47	22.99	103
Feb. 9.5	4.572	5	49.35	19	51.44	11	45.31	273	24.915	4	59.42	67	34.240	3	21.96	82
19.4	4.567	54	49.54	34	51.33	27	48.04	258	24.911	48	58.75	48	34.237	47	21.14	59
Mar. 1.4	4.513	95	49.88	41	51.06	41	50.62	233	24.863	88	58.27	27	34.190	87	20.55	41
11.4	4.418	130	50.29	47	50.65	52	52.95	198	24.775	119	58.00	12	34.103	119	20.14	21
21.4	4.288	152	50.76	48	50.13	61	54.93	155	24.656	141	57.88	2	33.984	140	19.93	6
31.3	4.136	168	51.24	46	49.52	67	56.48	108	24.515	154	57.90	14	33.844	154	19.87	9
Apr. 10.3	3.968	170	51.70	41	48.85	69	57.56	57	24.361	158	58.04	26	33.690	157	19.96	22
20.3	3.798	163	52.11	35	48.16	68	58.13	4	24.203	154	58.30	33	33.533	153	20.18	32
30.3	3.635	150	52.46	28	47.48	66	58.17	50	24.049	142	58.63	40	33.380	142	20.50	42
May 10.2	3.485	130	52.74	19	46.82	60	57.67	99	23.907	122	59.03	47	33.238	123	20.92	50
20.2	3.355	103	52.93	12	46.22	53	56.68	147	23.785	101	59.50	53	33.115	101	21.42	57
30.2	3.252	74	53.05	5	45.69	44	55.21	187	23.684	74	60.03	56	33.014	74	21.99	64
June 9.1	3.178	44	53.10	3	45.25	33	53.34	224	23.610	46	60.59	59	32.940	48	22.63	70
19.1	3.134	10	53.07	10	44.92	22	51.10	254	23.564	15	61.18	61	32.892	17	23.33	72
29.1	3.124	23	52.97	17	44.70	9	48.56	276	23.549	14	61.79	61	32.875	13	24.05	72
July 9.1	3.147	56	52.80	26	44.61	3	45.80	293	23.563	44	62.40	58	32.888	42	24.77	69
19.0	3.203	87	52.54	33	44.64	14	42.87	305	23.607	74	62.98	52	32.930	72	25.46	66
29.0	3.290	118	52.21	41	44.78	27	39.82	307	23.681	102	63.50	44	33.002	99	26.12	57
Aug. 8.0	3.408	146	51.80	52	45.05	38	36.75	303	23.783	131	63.94	32	33.101	128	26.69	45
18.0	3.554	176	51.28	62	45.43	48	33.72	296	23.914	158	64.26	16	33.229	155	27.14	30
27.9	3.730	203	50.66	74	45.91	58	30.76	281	24.072	183	64.42	1	33.384	181	27.44	10
Sept. 6.9	3.933	227	49.92	86	46.49	67	27.95	261	24.255	210	64.41	22	33.565	207	27.54	12
16.9	4.160	254	49.06	99	47.16	77	25.34	237	24.465	232	64.19	45	33.772	231	27.42	35
26.8	4.414	275	48.07	110	47.93	82	22.97	205	24.697	256	63.74	71	34.003	255	27.07	64
Oct. 6.8	4.689	295	46.97	122	48.75	88	20.92	170	24.953	275	63.03	94	34.258	274	26.43	89
16.8	4.984	312	45.75	129	49.63	93	19.22	130	25.228	293	62.09	118	34.532	291	25.54	115
26.8	5.296	324	44.46	134	50.56	95	17.92	86	25.521	305	60.91	138	34.823	304	24.39	137
Nov. 5.7	5.620	330	43.12	135	51.51	96	17.06	38	25.826	311	59.53	154	35.127	310	23.02	158
15.7	5.950	328	41.77	131	52.47	94	16.68	11	26.137	310	57.99	167	35.437	308	21.44	172
25.7	6.278	318	40.46	121	53.41	90	16.79	61	26.447	300	56.32	173	35.745	298	19.72	179
Dec. 5.7	6.596	297	39.25	109	54.31	82	17.40	111	26.747	282	54.59	173	36.043	282	17.93	182
15.6	6.893	208	38.16	92	55.13	73	18.51	157	27.029	254	52.86	166	36.325	253	16.11	179
25.6	7.161	231	37.24	71	55.86	61	20.08	199	27.283	218	51.20	155	36.578	217	14.32	167
35.6	7.392		36.53		56.47		22.07		27.501		49.65		36.795		12.65	
Mean Place	1.657		61.89		44.168		51.78		22.176		73.42		31.520		36.15	
Sec δ, Tan δ	1.069		+0.378		3.608		+3.467		1.005		+0.105		1.002		+0.063	
Dψα, Dωα	+0.07		+0.02		+0.13		+0.14		+0.06		0.00		+0.06		0.00	
Dψδ, Dωδ	−0.2		+0.8		−0.2		+0.8		−0.2		+0.8		−0.2		+0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cancri. Mag. 4.7 Right Ascension.		γ Cancri. Declination.		δ Cancri. Mag. 4.2 Right Ascension.		δ Cancri. Declination.		α Pyxidis. Mag. 3.7 Right Ascension.		α Pyxidis. Declination.		ι Cancri. Mag. 4.2 Right Ascension.		ι Cancri. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	8 38		+21 45		8 40		+18 26		8 40		−32 53		8 41		+29 2	
	s		″		s		″		s		″		s		″	
Jan. 0.6	38.483	217	26.49	59	7.414	214	58.67	79	22.500	191	39.81	327	50.483	231	72.19	18
10.6	38.700	167	25.90	36	7.628	165	57.88	57	22.691	136	43.08	325	50.714	180	72.01	8
20.5	38.867	114	25.54	12	7.793	114	57.31	35	22.827	81	46.33	315	50.894	124	72.09	33
30.5	38.981	60	25.42	7	7.907	59	56.96	13	22.908	24	49.48	296	51.018	66	72.42	52
Feb. 9.5	39.041	6	25.49	27	7.966	7	56.83	5	22.932	30	52.44	273	51.084	8	72.94	70
19.4	39.047	45	25.76	40	7.973	42	56.88	22	22.902	80	55.17	241	51.092	45	73.64	79
Mar. 1.4	39.002	88	26.16	48	7.931	85	57.10	32	22.822	123	57.58	207	51.047	91	74.43	84
11.4	38.914	123	26.64	54	7.846	120	57.42	41	22.699	158	59.65	170	50.956	130	75.27	85
21.4	38.791	148	27.18	56	7.726	143	57.83	44	22.541	182	61.35	130	50.826	157	76.12	79
31.3	38.643	164	27.74	52	7.583	158	58.27	45	22.359	199	62.65	91	50.669	174	76.91	69
Apr. 10.3	38.479	169	28.26	48	7.425	164	58.72	43	22.160	205	63.56	49	50.495	181	77.60	57
20.3	38.310	164	28.74	40	7.261	161	59.15	39	21.955	203	64.05	7	50.314	178	78.17	43
30.3	38.146	154	29.14	31	7.100	149	59.54	34	21.752	194	64.12	33	50.136	164	78.60	26
May 10.2	37.992	134	29.45	22	6.951	131	59.88	28	21.558	178	63.79	73	49.972	147	78.86	10
20.2	37.858	109	29.67	12	6.820	107	60.16	20	21.380	155	63.06	109	49.825	120	78.96	6
30.2	37.749	82	29.79	3	6.713	79	60.36	15	21.225	128	61.97	143	49.705	92	78.90	23
June 9.1	37.667	52	29.82	6	6.634	51	60.51	8	21.097	101	60.54	174	49.613	59	78.67	36
19.1	37.615	19	29.76	14	6.583	20	60.59	1	20.996	68	58.80	199	49.554	26	78.31	49
29.1	37.596	14	29.62	24	6.563	12	60.60	5	20.928	34	56.81	219	49.528	9	77.82	62
July 9.1	37.610	45	29.38	32	6.575	43	60.55	14	20.894	0	54.62	232	49.537	43	77.20	75
19.0	37.655	77	29.06	41	6.618	74	60.41	23	20.894	37	52.30	238	49.580	77	76.45	84
29.0	37.732	108	28.65	51	6.692	104	60.18	32	20.931	74	49.92	237	49.657	110	75.61	94
Aug. 8.0	37.840	137	28.14	60	6.796	132	59.86	42	21.005	110	47.55	226	49.767	141	74.67	104
18.0	37.977	166	27.54	73	6.928	161	59.44	55	21.115	147	45.29	206	49.908	173	73.63	113
27.9	38.143	193	26.81	84	7.089	188	58.89	69	21.262	183	43.23	179	50.081	203	72.50	122
Sept. 6.9	38.336	221	25.97	95	7.277	216	58.20	82	21.445	218	41.44	145	50.284	230	71.28	130
16.9	38.557	247	25.02	107	7.493	241	57.38	96	21.663	250	39.99	102	50.514	258	69.98	136
26.8	38.804	270	23.95	120	7.734	265	56.42	111	21.913	279	38.97	53	50.772	284	68.62	142
Oct. 6.8	39.074	292	22.75	129	7.999	286	55.31	124	22.192	305	38.44	1	51.056	308	67.20	145
16.8	39.366	311	21.46	136	8.285	306	54.07	134	22.497	324	38.45	54	51.364	326	65.75	145
26.8	39.677	325	20.10	140	8.591	318	52.73	142	22.821	337	38.99	108	51.690	342	64.30	141
Nov. 5.7	40.002	332	18.70	140	8.909	327	51.31	145	23.158	342	40.07	162	52.032	352	62.89	133
15.7	40.334	332	17.30	136	9.236	327	49.86	144	23.500	337	41.69	209	52.384	350	61.56	119
25.7	40.666	325	15.94	125	9.563	318	48.42	138	23.837	323	43.78	250	52.734	344	60.37	104
Dec. 5.7	40.991	305	14.69	111	9.881	301	47.04	126	24.160	297	46.28	282	53.078	324	59.33	82
15.6	41.296	278	13.58	93	10.182	273	45.78	110	24.457	263	49.10	307	53.402	295	58.51	58
25.6	41.574	241	12.65	70	10.455	238	44.68	91	24.720	218	52.17	321	53.697	257	57.93	32
35.6	41.815		11.95		10.693		43.77		24.938		55.38		53.954		57.61	
Mean Place	36.107		38.51		5.083		70.21		20.206		37.47		48.010		85.49	
Sec δ, Tan δ	1.077		+0.399		1.054		+0.334		1.191		−0.647		1.144		+0.556	
$D_\psi \alpha$, $D_\omega \alpha$	+0.07		+0.02		+0.07		+0.01		+0.05		−0.03		+0.07		+0.02	
$D_\psi \delta$, $D_\omega \delta$	−0.3		+0.8		−0.3		+0.8		−0.3		+0.8		−0.3		+0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Argus. Mag. 2.0				ε Hydræ. Mag. 3.5				σ^2 Cancri (*mean*). Mag. 5.5				ζ Hydræ. Mag. 3.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 8 42		° ′ −54 24		h m 8 42		° ′ + 6 42		h m 8 49		° ′ +30 52		h m 8 51		° ′ + 6 14	
	s		″		s		″		s		″		s		″	
Jan. 0.6	30.559		39.81		31.523		51.21		20.893		59.52		9.043		66.95	
10.6	30.775	216	43.54	373	31.727	204	49.73	148	21.137	244	59.40	12	9.254	211	65.43	152
20.5	30.915	140	47.34	380	31.884	157	48.44	129	21.325	188	59.57	17	9.419	165	64.09	134
30.5	30.979	64	51.12	378	31.992	108	47.37	107	21.459	134	59.98	41	9.535	116	62.97	112
Feb. 9.5	30.965	14	54.76	364	32.048	56	46.51	86	21.535	76	60.61	63	9.599	64	62.07	90
19.5	30.879	86	58.18	342	32.054	6	45.87	64	21.552	17	61.40	79	9.613	14	61.39	68
Mar. 1.4	30.728	151	61.31	313	32.014	40	45.42	45	21.514	38	62.31	91	9.581	32	60.92	47
11.4	30.520	208	64.09	278	31.933	81	45.18	24	21.427	87	63.26	95	9.508	73	60.65	27
21.4	30.264	256	66.45	236	31.821	112	45.09	9	21.302	125	64.21	95	9.401	107	60.54	11
31.3	29.974	290	68.37	192	31.685	136	45.14	5	21.146	156	65.10	89	9.271	130	60.58	4
Apr. 10.3	29.657	317	69.80	143	31.534	151	45.31	17	20.972	174	65.88	78	9.124	147	60.74	16
20.3	29.330	327	70.74	94	31.378	156	45.58	27	20.790	182	66.52	64	8.971	153	61.01	27
30.3	29.000	330	71.16	42	31.225	153	45.92	34	20.608	182	67.00	48	8.820	151	61.36	35
May 10.2	28.679	321	71.08	8	31.083	142	46.33	41	20.438	170	67.29	29	8.678	142	61.78	42
20.2	28.377	302	70.49	59	30.958	125	46.79	46	20.286	152	67.40	11	8.551	127	62.25	47
30.2	28.099	278	69.42	107	30.854	104	47.30	51	20.157	129	67.33	7	8.445	106	62.77	52
June 9.2	27.854	245	67.90	152	30.775	79	47.83	53	20.059	98	67.07	26	8.363	82	63.32	55
19.1	27.648	206	65.98	192	30.725	50	48.39	56	19.992	67	66.66	41	8.306	57	63.89	57
29.1	27.487	161	63.69	229	30.702	23	48.95	56	19.959	33	66.09	57	8.278	28	64.47	58
July 9.1	27.375	112	61.11	258	30.708	6	49.51	56	19.960	1	65.38	71	8.277	1	65.04	57
19.0	27.315	60	58.32	279	30.745	37	50.03	52	19.996	36	64.54	84	8.306	29	65.58	54
29.0	27.309	6	55.39	293	30.811	66	50.49	46	20.066	70	63.59	95	8.363	57	66.05	47
Aug. 8.0	27.361	52	52.42	297	30.905	94	50.87	38	20.169	103	62.52	107	8.448	85	66.44	39
18.0	27.471	110	49.52	290	31.027	122	51.11	24	20.305	136	61.35	117	8.562	114	66.70	26
27.9	27.639	168	46.78	274	31.175	148	51.22	11	20.471	166	60.09	126	8.702	140	66.81	11
Sept. 6.9	27.863	224	44.31	247	31.352	177	51.16	6	20.669	198	58.75	134	8.871	169	66.75	6
16.9	28.142	279	42.21	210	31.554	202	50.87	29	20.896	227	57.34	141	9.065	194	66.47	28
26.9	28.471	329	40.57	164	31.781	227	50.37	50	21.153	257	55.86	148	9.287	222	65.97	50
Oct. 6.8	28.843	372	39.46	111	32.033	252	49.62	75	21.436	283	54.33	153	9.533	246	65.21	76
16.8	29.251	408	38.95	51	32.305	272	48.64	98	21.745	309	52.80	153	9.802	269	64.23	98
26.8	29.685	434	39.07	12	32.595	290	47.43	121	22.073	328	51.28	152	10.090	288	63.00	123
Nov. 5.7	30.134	449	39.84	77	32.900	305	46.01	142	22.420	347	49.81	147	10.394	304	61.58	142
15.7	30.585	451	41.25	141	33.212	312	44.46	155	22.775	355	48.44	137	10.707	313	59.98	160
25.7	31.023	438	43.25	200	33.525	313	42.77	169	23.133	358	47.22	122	11.021	314	58.28	170
Dec. 5.7	31.434	411	45.80	255	33.828	303	41.04	173	23.484	351	46.19	103	11.328	307	56.51	177
15.6	31.805	371	48.80	300	34.116	288	39.31	173	23.817	333	45.39	80	11.620	292	54.74	177
25.6	32.125	320	52.15	335	34.377	261	37.65	166	24.122	305	44.84	55	11.886	266	53.03	171
35.6	32.381	256	55.76	361	34.603	226	36.11	154	24.389	267	44.59	25	12.120	234	51.43	160
Mean Place	27.805		40.77		29.300		60.76		18.425		73.47		6.851		76.60	
Sec δ, Tan δ	1.718		−1.398		1.007		+0.118		1.165		+0.598		1.006		+0.110	
$D_\psi a$, $D_\omega a$	+0.03		−0.06		+0.06		+0.01		+0.07		+0.03		+0.06		0.00	
$D_\psi \delta$, $D_\omega \delta$	−0.3		+0.8		−0.3		+0.8		−0.3		+0.7		−0.3		+0.7	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	σ² Ursæ Majoris. Mag. 4.9 Right Ascension.		Declination.		κ Cancri. Mag. 5.1 Right Ascension.		Declination.		λ Argus. Mag. 2.2 Right Ascension.		Declination.		θ Hydræ. Mag. 3.8 Right Ascension.		Declination.
	h m		° ′		h m		° ′		h m		° ′		h m		°
	9 3		+67 27		9 3		+10 59		9 5		−43 6		9 10		+ 2
	s		″		s		″		s		″		s		″
Jan. 0.6	21.52		33.66		23.903		30.84		3.343		18.52		11.214		75.16
10.6	22.00	48	35.32	166	24.128	225	29.53	131	3.571	228	22.02	350	11.438	224	73.38
20.6	22.37	37	37.36	204	24.308	180	28.44	109	3.742	171	25.57	355	11.619	181	71.79
30.5	22.63	26	39.67	231	24.440	132	27.57	87	3.850	108	29.09	352	11.752	133	70.39
Feb. 9.5	22.76	13	42.18	251	24.520	80	26.95	62	3.894	44	32.50	341	11.834	82	69.22
19.5	22.77	1	44.78	260	24.548	28	26.54	41	3.878	16	35.71	321	11.866	32	68.28
Mar. 1.4	22.66	11	47.32	254	24.528	20	26.34	20	3.804	74	38.65	294	11.851	15	67.58
11.4	22.45	21	49.73	241	24.466	62	26.31	3	3.681	123	41.25	260	11.794	57	67.09
21.4	22.14	31	51.91	218	24.369	97	26.43	12	3.516	165	43.48	223	11.703	91	66.81
31.4	21.76	38	53.76	185	24.244	125	26.67	24	3.319	197	45.31	183	11.585	118	66.70
Apr. 10.3	21.32	44	55.21	145	24.102	142	26.99	32	3.100	219	46.71	140	11.449	136	66.75
20.3	20.85	47	56.20	99	23.952	150	27.37	38	2.867	233	47.65	94	11.304	145	66.95
30.3	20.37	48	56.72	52	23.801	151	27.78	41	2.629	238	48.14	49	11.158	146	67.25
May 10.3	19.90	47	56.74	2	23.657	144	28.21	43	2.396	233	48.17	3	11.017	141	67.66
20.2	19.47	43	56.27	47	23.527	130	28.65	44	2.175	221	47.74	43	10.889	128	68.15
30.2	19.07	40	55.34	93	23.416	111	29.09	44	1.972	203	46.86	88	10.778	111	68.7
June 9.2	18.73	34	53.97	137	23.327	89	29.51	42	1.792	180	45.58	128	10.687	91	69.3
19.1	18.46	27	52.21	176	23.264	63	29.91	40	1.640	152	43.92	166	10.620	67	70.0
29.1	18.25	21	50.11	210	23.227	37	30.27	36	1.520	120	41.93	199	10.577	43	70.7
July 9.1	18.13	12	47.72	239	23.219	8	30.59	32	1.435	85	39.66	227	10.561	16	71.4
19.1	18.09	4	45.09	263	23.239	20	30.84	25	1.388	47	37.19	247	10.573	12	72.1
29.0	18.14	5	42.30	279	23.287	48	31.02	18	1.382	6	34.58	261	10.610	37	72.7
Aug. 8.0	18.26	12	39.38	292	23.363	76	31.11	9	1.419	37	31.93	265	10.677	67	73.2
18.0	18.46	20	36.41	297	23.468	105	31.07	4	1.499	80	29.33	260	10.770	93	73.7
28.0	18.74	28	33.44	297	23.600	132	30.88	19	1.624	125	26.85	248	10.892	122	73.9
Sept. 6.9	19.10	36	30.52	292	23.761	161	30.53	35	1.793	169	24.62	223	11.041	149	74.0
16.9	19.54	44	27.71	281	23.948	187	30.00	53	2.006	213	22.71	191	11.219	178	73.9
26.9	20.03	49	25.09	262	24.164	216	29.25	75	2.262	256	21.22	149	11.425	206	73.5
Oct. 6.8	20.58	55	22.67	242	24.405	241	28.31	94	2.554	292	20.21	101	11.658	233	72.8
16.8	21.19	61	20.53	214	24.672	267	27.16	115	2.882	328	19.76	45	11.917	259	71.9
26.8	21.85	66	18.73	180	24.959	287	25.83	133	3.236	354	19.88	12	12.197	280	70.7
Nov. 5.8	22.53	68	17.30	143	25.265	306	24.34	149	3.610	374	20.60	72	12.496	299	69.3
15.7	23.24	71	16.31	99	25.581	316	22.72	162	3.993	383	21.91	131	12.807	311	67.6
25.7	23.95	71	15.79	52	25.901	320	21.04	168	4.374	381	23.79	188	13.123	316	65.8
Dec. 5.7	24.64	69	15.75	4	26.218	317	19.34	170	4.742	368	26.16	237	13.435	312	63.9
15.6	25.30	66	16.23	48	26.520	302	17.70	164	5.085	343	28.95	279	13.734	299	62.0
25.6	25.90	60	17.19	96	26.800	280	16.15	155	5.391	306	32.09	314	14.011	277	60.1
35.6	26.43	53	18.62	143	27.047	247	14.75	140	5.650	259	35.46	337	14.256	245	58.2
Mean Place	17.278		52.65		21.729		41.70		0.963		18.77		9.107		84.3
Sec δ, Tan δ	2.609		+2.410		1.019		+0.194		1.370		−0.936		1.001		+0.0
Dψa, Dωa	*+0.11*		+0.12		+0.06		+0.01		+0.04		−0.04		+0.06		0.0
Dψδ, Dωδ	*−0.3*		+0.7		−0.3		+0.7		−0.3		+0.7		−0.3		+0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Argus. Mag. 1.8				83 Cancri. Mag. 6.6				ι Argus. Mag. 2.2				40 Lyncis. Mag. 3.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 9 12		° ′ −69 22		h m 9 14		° ′ +18 2		h m 9 14		° ′ −58 56		h m 9 16		° ′ +34 43	
	s		″		s		″		s		″		s		″	
Jan. 0.6	22.69		56.18		30.019		45.36		58.049		2.52		9.920		53.26	
10.6	23.04	35	59.83	365	30.261	242	44.40	96	58.336	287	6.16	364	10.195	275	53.20	6
20.6	23.28	24	63.67	384	30.458	197	43.69	71	58.544	208	9.97	381	10.420	225	53.47	27
30.5	23.41	13	67.60	393	30.606	148	43.22	47	58.668	124	13.83	386	10.588	168	54.03	56
Feb. 9.5	23.41	0	71.52	392	30.699	93	43.01	21	58.708	40	17.63	380	10.695	107	54.85	82
19.5	23.31	10	75.31	379	30.740	41	43.02	1	58.667	41	21.30	367	10.741	46	55.87	102
Mar. 1.4	23.09	22	78.90	359	30.731	9	43.23	21	58.550	117	24.73	343	10.729	12	57.03	116
11.4	22.78	31	82.21	331	30.677	54	43.59	36	58.363	187	27.86	313	10.664	65	58.26	123
21.4	22.38	40	85.16	295	30.586	91	44.05	46	58.120	243	30.64	278	10.555	109	59.48	122
31.4	21.93	45	87.70	254	30.464	122	44.58	53	57.830	290	33.00	236	10.411	144	60.63	115
Apr. 10.3	21.42	51	89.80	210	30.323	141	45.14	56	57.505	325	34.91	191	10.241	170	61.68	105
20.3	20.87	55	91.40	160	30.171	152	45.70	56	57.156	349	36.32	141	10.058	183	62.56	88
30.3	20.30	57	92.48	108	30.017	154	46.22	52	56.795	361	37.24	92	9.870	188	63.24	68
May 10.3	19.73	57	93.03	55	29.868	149	46.69	47	56.434	361	37.64	40	9.687	183	63.71	47
20.2	19.17	56	93.03	0	29.731	137	47.09	40	56.082	352	37.52	12	9.521	166	63.93	22
30.2	18.63	54	92.50	53	29.612	119	47.42	33	55.747	335	36.89	63	9.372	149	63.93	0
June 9.2	18.13	50	91.46	104	29.515	97	47.65	23	55.440	307	35.77	112	9.250	122	63.69	24
19.1	17.68	45	89.93	153	29.443	72	47.81	16	55.168	272	34.20	157	9.155	95	63.24	45
29.1	17.29	39	87.96	197	29.396	47	47.88	7	54.936	232	32.21	199	9.093	62	62.58	66
July 9.1	16.98	31	85.61	235	29.379	17	47.85	3	54.752	184	29.86	235	9.064	29	61.73	85
19.1	16.74	24	82.92	269	29.390	11	47.72	13	54.622	130	27.22	264	9.068	4	60.71	102
29.0	16.58	16	80.01	291	29.429	39	47.47	25	54.550	72	24.38	284	9.107	39	59.52	119
Aug. 8.0	16.53	5	76.94	307	29.497	68	47.12	35	54.541	9	21.41	297	9.180	73	58.19	133
18.0	16.58	5	73.84	310	29.594	97	46.64	48	54.598	57	18.43	298	9.287	107	56.74	145
28.0	16.73	15	70.80	304	29.720	126	46.00	64	54.721	123	15.52	291	9.427	140	55.17	157
Sept. 6.9	16.98	25	67.93	287	29.876	156	45.23	77	54.913	192	12.83	269	9.601	174	53.50	167
16.9	17.34	36	65.35	258	30.060	184	44.30	93	55.171	258	10.42	241	9.809	208	51.77	173
26.9	17.79	45	63.15	220	30.273	213	43.21	109	55.492	321	8.41	201	10.049	240	49.97	180
Oct. 6.8	18.32	53	61.44	171	30.514	241	41.96	125	55.871	379	6.89	152	10.321	272	48.14	183
16.8	18.92	60	60.29	115	30.781	267	40.57	139	56.299	428	5.94	95	10.623	302	46.31	183
26.8	19.57	65	59.77	52	31.072	291	39.05	152	56.766	467	5.59	35	10.950	327	44.53	178
Nov. 5.8	20.26	69	59.90	13	31.384	312	37.45	160	57.260	494	5.90	31	11.300	350	42.82	171
15.7	20.96	70	60.70	80	31.708	324	35.80	165	57.765	505	6.86	96	11.666	366	41.26	156
25.7	21.65	69	62.17	147	32.039	331	34.18	162	58.268	503	8.46	160	12.039	373	39.88	138
Dec. 5.7	22.30	65	64.23	206	32.368	329	32.60	158	58.750	482	10.64	218	12.410	371	38.74	114
15.7	22.90	60	66.86	263	32.686	318	31.14	146	59.194	444	13.34	270	12.767	357	37.86	88
25.6	23.41	51	69.95	309	32.980	294	29.84	130	59.589	395	16.49	315	13.102	335	37.29	57
35.6	23.83	42	73.39	344	33.244	264	28.75	109	59.917	328	19.99	350	13.400	298	37.05	24
Mean Place	19.002		60.47		27.838		57.98		55.198		5.68		7.530		69.16	
Sec δ, Tan δ	2.841		−2.659		1.052		+0.326		1.938		−1.661		1.217		+0.693	
$D_\psi \alpha$, $D_\omega \alpha$	+0.01		−0.13		+0.07		+0.02		+0.03		−0.08		+0.07		+0.03	
$D_\psi \delta$, $D_\omega \delta$	−0.3		+0.7		−0.3		+0.7		−0.3		+0.7		−0.3		+0.7	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Pyxidis. Mag. 4.9 Right Ascension.		θ Pyxidis. Declination.		α Hydræ. Mag. 2.2 Right Ascension.		α Hydræ. Declination.		h Ursæ Majoris. Mag. 3.8 Right Ascension.		h Ursæ Majoris. Declination.		d Ursæ Majoris. Mag. 4.6 Right Ascension.		d Ursæ Majoris. Declina tion.
	h m 9 17		° ′ −25 37		h m 9 23		° ′ − 8 18		h m 9 25		° ′ +63 24		h m 9 27		° +70
	s		″		s		″		s		″		s		″
Jan. 0.6	56.311		16.77		38.491		31.23		13.22		40.85		25.15		53.79
10.6	56.538	227	19.76	299	38.721	230	33.54	231	13.66	44	42.16	131	25.73	58	55.35
20.6	56.718	180	22.73	297	38.910	189	35.74	220	14.03	37	43.87	171	26.19	46	57.33
30.5	56.847	129	25.63	290	39.048	138	37.77	203	14.30	27	45.92	205	26.53	34	59.65
Feb. 9.5	56.922	75	28.37	274	39.138	90	39.62	185	14.48	18	48.21	229	26.74	21	62.22
19.5	56.945	23	30.88	251	39.178	40	41.22	160	14.55	7	50.66	245	26.81	7	64.91
Mar. 1.5	56.917	28	33.15	227	39.171	7	42.57	135	14.50	5	53.15	249	26.73	8	67.63
11.4	56.847	70	35.10	195	39.123	48	43.66	109	14.36	14	55.57	242	26.55	18	70.24
21.4	56.739	108	36.74	164	39.038	85	44.50	84	14.14	22	57.82	225	26.25	30	72.66
31.4	56.604	135	38.03	129	38.926	112	45.08	58	13.85	29	59.81	199	25.85	40	74.78
Apr. 10.3	56.448	156	38.98	95	38.795	131	45.41	33	13.51	34	61.46	165	25.39	46	76.51
20.3	56.279	169	39.56	58	38.653	142	45.53	12	13.14	37	62.71	125	24.87	52	77.80
30.3	56.108	171	39.79	23	38.507	146	45.42	11	12.74	40	63.52	81	24.32	55	78.60
May 10.3	55.939	169	39.67	12	38.364	143	45.11	31	12.36	38	63.86	34	23.79	53	78.90
20.2	55.781	158	39.22	45	38.231	133	44.61	50	11.98	38	63.74	12	23.27	52	78.69
30.2	55.637	144	38.45	75	38.112	119	43.92	69	11.63	35	63.15	59	22.78	49	77.97
June 9.2	55.513	124	37.37	108	38.011	101	43.10	82	11.33	30	62.13	102	22.34	44	76.78
19.2	55.409	104	36.02	135	37.931	80	42.14	96	11.07	26	60.71	142	21.97	37	75.1
29.1	55.332	77	34.44	158	37.874	57	41.07	107	10.88	19	58.92	179	21.68	29	73.1
July 9.1	55.281	51	32.68	176	37.841	33	39.91	116	10.74	14	56.80	212	21.46	22	70.7
19.1	55.260	21	30.78	190	37.834	7	38.72	119	10.68	6	54.42	238	21.33	13	68.1
29.0	55.269	9	28.80	198	37.854	20	37.54	118	10.68	0	51.82	260	21.31	2	65.2
Aug. 8.0	55.309	40	26.81	199	37.901	47	36.41	113	10.74	6	49.06	276	21.37	6	62.2
18.0	55.383	74	24.89	192	37.977	76	35.37	104	10.88	14	46.19	287	21.51	14	59.1
28.0	55.490	107	23.12	177	38.082	105	34.48	89	11.07	19	43.26	293	21.75	24	55.9
Sept. 6.9	55.630	140	21.57	155	38.216	134	33.81	67	11.34	27	40.33	293	22.09	34	52.8
16.9	55.806	176	20.31	126	38.381	165	33.37	44	11.68	34	37.45	288	22.50	41	49.7
26.9	56.015	209	19.40	91	38.574	193	33.25	12	12.07	39	34.69	276	22.99	49	46.8
Oct. 6.9	56.255	240	18.92	48	38.798	224	33.45	20	12.51	44	32.09	260	23.55	56	44.1
16.8	56.526	271	18.90	2	39.050	252	34.01	56	13.01	50	29.71	238	24.19	64	41.7
26.8	56.824	298	19.38	48	39.325	275	34.92	91	13.55	54	27.63	208	24.88	69	39.5
Nov. 5.8	57.140	316	20.34	96	39.621	296	36.18	126	14.13	58	25.87	176	25.62	74	37.8
15.7	57.469	329	21.77	143	39.932	311	37.77	159	14.74	61	24.51	136	26.40	78	36.5
25.7	57.803	334	23.63	186	40.248	316	39.62	185	15.35	61	23.59	92	27.18	78	35.7
Dec. 5.7	58.131	328	25.89	226	40.562	314	41.71	209	15.97	62	23.14	45	27.96	78	35.4
15.7	58.443	312	28.45	256	40.865	303	43.94	223	16.57	60	23.19	5	28.71	75	35.7
25.6	58.730	287	31.23	278	41.146	281	46.25	231	17.12	55	23.74	55	29.42	71	36.4
35.6	58.981	251	34.16	293	41.396	250	48.56	231	17.62	50	24.77	103	30.05	63	37.7
Mean Place	54.186		13.95		36.448		24.48		9.712		61.11		20.888		74.6
Sec δ, Tan δ	1.109		−0.480		1.011		−0.146		2.234		+1.998		2.950		+2.7
$D_\psi a$, $D_\omega a$	+0.05		−0.02		+0.06		−0.01		+0.09		+0.10		+0.11		+0.1
$D_\psi \delta$, $D_\omega \delta$	−0.3		+0.7		−0.3		+0.6		−0.3		+0.6		−0.3		+0.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	θ Ursæ Majoris. Mag. 3.3				ψ Argus. Mag. 3.6				ξ Leonis. Mag. 5.1				10 Leonis Minoris. Mag. 4.6			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	9 27		+52 2		9 27		−40 6		9 27		+11 39		9 29		+36 44	
	s		″		s		″		s		″		s		″	
Jan. 0.6	29.761		31.33		32.656		42.43		36.994		21.65		18.365		71.92	
10.6	30.114	353	32.07	74	32.908	252	45.78	335	37.240	246	20.29	136	18.658	293	71.88	4
20.6	30.403	289	33.20	113	33.105	197	49.22	344	37.443	203	19.16	113	18.900	242	72.19	31
30.5	30.622	219	34.67	147	33.245	140	52.66	344	37.598	155	18.27	89	19.085	185	72.83	64
Feb. 9.5	30.763	141	36.42	175	33.323	78	56.01	335	37.702	104	17.63	64	19.211	126	73.73	90
19.5	30.825	62	38.34	192	33.342	19	59.18	317	37.755	53	17.23	40	19.274	63	74.86	113
Mar. 1.5	30.810	15	40.36	202	33.306	36	62.11	293	37.759	4	17.06	17	19.275	1	76.14	128
11.4	30.725	85	42.38	202	33.220	86	64.73	262	37.718	41	17.07	1	19.223	52	77.50	136
21.4	30.576	149	44.30	192	33.091	129	67.01	228	37.639	79	17.25	18	19.125	98	78.86	136
31.4	30.378	198	46.04	174	32.928	163	68.92	191	37.531	108	17.55	30	18.987	138	80.17	131
Apr. 10.3	30.143	235	47.54	150	32.740	188	70.42	150	37.403	128	17.93	38	18.820	167	81.34	117
20.3	29.882	261	48.72	118	32.536	204	71.49	107	37.262	141	18.37	44	18.638	182	82.36	102
30.3	29.612	270	49.55	83	32.323	213	72.13	64	37.117	145	18.85	48	18.449	189	83.15	79
May 10.3	29.345	267	50.02	47	32.112	211	72.33	20	36.975	142	19.34	49	18.262	187	83.71	56
20.2	29.091	254	50.09	7	31.907	205	72.09	24	36.842	133	19.82	48	18.086	176	84.01	30
30.2	28.858	233	49.78	31	31.714	193	71.43	66	36.725	117	20.28	46	17.928	158	84.06	5
June 9.2	28.657	201	49.09	69	31.541	173	70.37	106	36.626	99	20.71	43	17.793	135	83.84	22
19.2	28.492	165	48.06	103	31.390	151	68.94	143	36.550	76	21.11	40	17.687	106	83.39	45
29.1	28.367	125	46.71	135	31.266	124	67.17	177	36.497	53	21.45	34	17.610	77	82.69	70
July 9.1	28.287	80	45.07	164	31.172	94	65.11	206	36.470	27	21.73	28	17.565	45	81.79	90
19.1	28.252	35	43.19	188	31.112	60	62.84	227	36.469	1	21.92	19	17.555	10	80.67	112
29.0	28.264	12	41.08	211	31.087	25	60.41	243	36.495	26	22.03	11	17.578	23	79.39	128
Aug. 8.0	28.323	59	38.82	226	31.101	14	57.92	249	36.547	52	22.04	1	17.636	58	77.94	145
18.0	28.429	106	36.43	239	31.155	54	55.43	249	36.628	81	21.91	13	17.728	92	76.34	160
28.0	28.582	153	33.94	249	31.250	95	53.04	239	36.737	109	21.63	28	17.856	128	74.62	172
Sept. 6.9	28.782	200	31.41	253	31.389	139	50.87	217	36.874	137	21.19	44	18.019	163	72.80	182
16.9	29.027	245	28.87	254	31.572	183	48.98	189	37.041	167	20.54	65	18.216	197	70.90	190
26.9	29.316	289	26.37	250	31.796	224	47.46	152	37.237	196	19.71	83	18.447	231	68.94	196
Oct. 6.9	29.648	332	23.96	241	32.061	265	46.39	107	37.462	225	18.67	104	18.713	266	66.95	199
16.8	30.019	371	21.68	228	32.363	302	45.83	56	37.715	253	17.42	125	19.012	299	64.98	197
26.8	30.427	408	19.60	208	32.694	331	45.84	1	37.992	277	16.00	142	19.339	327	63.05	193
Nov. 5.8	30.864	437	17.75	185	33.051	357	46.42	58	38.291	299	14.41	159	19.691	352	61.22	183
15.7	31.322	458	16.20	155	33.422	371	47.57	115	38.606	315	12.71	170	20.061	370	59.56	166
25.7	31.792	470	15.01	119	33.797	375	49.26	169	38.929	323	10.94	177	20.442	381	58.08	148
Dec. 5.7	32.260	468	14.20	81	34.166	369	51.46	220	39.253	324	9.17	177	20.824	382	56.86	122
15.7	32.714	454	13.82	38	34.515	349	54.09	263	39.567	314	7.44	173	21.196	372	55.94	92
25.6	33.141	427	13.87	5	34.834	319	57.07	298	39.861	294	5.83	161	21.544	348	55.35	59
35.6	33.524	383	14.36	49	35.112	278	60.29	322	40.126	265	4.37	146	21.860	316	55.12	23
Mean Place	26.972		50.49		30.401		42.94		34.920		33.18		16.020		88.79	
Sec δ, Tan δ	1.626		+1.282		1.308		−0.843		1.021		+0.206		1.248		+0.747	
$D_\psi a$, $D_\omega a$	+0.08		+0.07		+0.05		−0.04		+0.06		+0.01		+0.07		+0.04	
$D_\psi \delta$, $D_\omega \delta$	−0.3		+0.6		−0.3		+0.6		−0.3		+0.6		−0.3		+0.6	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ο Leonis. Mag. 3.8 Right Ascension.		ο Leonis. Declination.		θ Antliæ. Mag. 5.0 Right Ascension.		θ Antliæ. Declination.		ε Leonis. Mag. 3.1 Right Ascension.		ε Leonis. Declination.		υ Arg… Mag. … Right Ascension.	
	h m 9 36		° ′ +10 15		h m 9 40		° ′ −27 23		h m 9 41		° ′ +24 8		h m 9 45	
	s		″		s		″		s		″		s	
Jan. 0.6	51.803		30.30		37.487		54.99		17.513		37.27		7.76	
10.6	52.053	250	28.84	146	37.737	250	57.98	299	17.785	272	36.50	77	8.14	38
20.6	52.263	210	27.61	123	37.941	204	61.01	303	18.015	230	36.02	48	8.44	30
30.5	52.426	163	26.61	100	38.095	154	63.99	298	18.195	180	35.86	16	8.64	20
Feb. 9.5	52.538	112	25.87	74	38.196	101	66.84	285	18.321	126	35.96	—10	8.75	11
19.5	52.600	62	25.36	51	38.244	48	69.48	264	18.393	72	36.33	37	8.76	1
Mar. 1.5	52.613	13	25.10	26	38.240	—4	71.90	242	18.411	18	36.90	57	8.67	—9
11.4	52.581	—32	25.04	6	38.193	47	74.03	213	18.381	—30	37.63	73	8.51	16
21.4	52.511	70	25.14	—10	38.105	88	75.85	182	18.308	73	38.46	83	8.27	24
31.4	52.411	100	25.40	26	37.986	119	77.33	148	18.201	107	39.33	87	7.96	31
Apr. 10.4	52.288	123	25.75	35	37.844	142	78.46	113	18.070	131	40.20	87	7.61	35
20.3	52.153	135	26.18	43	37.687	157	79.25	79	17.922	148	41.01	81	7.22	39
30.3	52.011	142	26.65	47	37.521	166	79.67	42	17.767	155	41.74	73	6.80	42
May 10.3	51.872	139	27.15	50	37.355	166	79.73	6	17.613	154	42.36	62	6.37	43
20.2	51.740	132	27.66	51	37.195	160	79.45	—28	17.466	147	42.84	48	5.94	43
30.2	51.622	118	28.16	50	37.045	150	78.83	62	17.333	133	43.18	34	5.51	43
June 9.2	51.520	102	28.63	47	36.910	135	77.90	93	17.219	114	43.36	18	5.11	40
19.2	51.440	80	29.07	44	36.794	116	76.68	122	17.126	93	43.39	3	4.74	37
29.1	51.382	58	29.47	40	36.700	94	75.20	148	17.059	67	43.26	—13	4.40	34
July 9.1	51.348	34	29.82	35	36.630	70	73.50	170	17.016	43	42.97	29	4.12	28
19.1	51.338	10	30.09	27	36.587	43	71.65	185	17.002	14	42.54	43	3.89	23
29.1	51.356	—18	30.27	18	36.573	14	69.69	196	17.015	—13	41.96	58	3.72	17
Aug. 8.0	51.399	43	30.35	8	36.590	—17	67.70	199	17.057	42	41.21	75	3.64	8
18.0	51.470	71	30.29	—6	36.638	48	65.74	196	17.129	72	40.33	88	3.63	1
28.0	51.568	98	30.07	22	36.721	83	63.88	186	17.232	103	39.30	103	3.70	—7
Sept. 6.9	51.696	128	29.69	38	36.840	119	62.23	165	17.364	132	38.10	120	3.85	15
16.9	51.854	158	29.11	58	36.996	156	60.83	140	17.529	165	36.77	133	4.09	24
26.9	52.040	186	28.32	79	37.187	191	59.78	105	17.725	196	35.29	148	4.42	33
Oct. 6.9	52.258	218	27.32	100	37.414	227	59.13	65	17.953	228	33.69	160	4.82	40
16.8	52.504	246	26.09	123	37.676	262	58.94	19	18.212	259	31.98	171	5.29	47
26.8	52.775	271	24.67	142	37.965	289	59.22	—28	18.499	287	30.21	177	5.82	53
Nov. 5.8	53.069	294	23.08	159	38.281	316	60.00	78	18.811	312	28.40	181	6.39	57
15.8	53.382	313	21.36	172	38.613	332	61.28	128	19.141	330	26.60	180	6.98	59
25.7	53.704	322	19.55	181	38.953	340	63.00	172	19.484	343	24.88	172	7.58	60
Dec. 5.7	54.028	324	17.72	183	39.293	340	65.14	214	19.830	346	23.28	160	8.17	59
15.7	54.343	315	15.92	180	39.620	327	67.62	248	20.168	338	21.85	143	8.73	56
25.6	54.640	297	14.21	171	39.924	304	70.35	273	20.490	322	20.66	119	9.23	50
35.6	54.911	271	12.67	154	40.196	272	73.25	290	20.782	292	19.72	94	9.66	43
Mean Place	49.779		41.67		35.426		53.09		15.414		52.02		4.691	
Sec δ, Tan δ	1.016		+0.181		1.126		−0.518		1.096		+0.448		2.340	
$D_\psi a$, $D_\omega a$	+0.06		+0.01		+0.05		−0.03		+0.07		+0.02		+0.03	
$D_\psi \delta$, $D_\omega \delta$	−0.3		+0.6		−0.3		+0.6		−0.3		+0.6		−0.3	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	υ Ursæ Majoris. Mag. 3.9 Right Ascension.		Declination.		6 Sextantis. Mag. 6.0 Right Ascension.		Declination.		μ Leonis. Mag. 4.1 Right Ascension.		Declination.		Groombridge 1586. Mag. 6.0 Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	9 45		+59 24		9 47		− 3 51		9 48		+26 22		9 51		+73 15	
	s		″		s		″		s		″		s		″	
Jan. 0.6	17.572	433	52.78	91	11.134	250	55.03	213	11.667	283	65.32	71	14.76	71	33.14	142
10.6	18.005	363	53.69	137	11.384	210	57.16	201	11.950	239	64.61	37	15.47	59	34.56	189
20.6	18.368	281	55.06	175	11.594	165	59.17	183	12.189	189	64.24	7	16.06	46	36.45	229
30.6	18.649	191	56.81	206	11.759	116	61.00	162	12.378	135	64.17	23	16.52	29	38.74	259
Feb. 9.5	18.840	99	58.87	226	11.875	66	62.62	139	12.513	80	64.40	48	16.81	15	41.33	277
19.5	18.939	5	61.13	237	11.941	19	64.01	112	12.593	25	64.88	71	16.96	0	44.10	285
Mar. 1.5	18.944	81	63.50	237	11.960	24	65.13	89	12.618	23	65.59	85	16.96	17	46.95	280
11.4	18.863	158	65.87	228	11.936	62	66.02	64	12.595	69	66.44	96	16.79	30	49.75	263
21.4	18.705	223	68.15	206	11.874	91	66.66	42	12.526	104	67.40	99	16.49	41	52.38	236
31.4	18.482	274	70.21	179	11.783	114	67.08	20	12.422	130	68.39	97	16.08	52	54.74	201
Apr. 10.4	18.208	310	72.00	145	11.669	128	67.28	1	12.292	148	69.36	91	15.56	59	56.75	156
20.3	17.898	330	73.45	105	11.541	135	67.29	17	12.144	158	70.27	81	14.97	63	58.31	109
30.3	17.568	335	74.50	61	11.406	136	67.12	33	11.986	158	71.08	66	14.34	64	59.40	57
May 10.3	17.233	326	75.11	17	11.270	129	66.79	47	11.828	151	71.74	51	13.70	65	59.97	2
20.2	16.907	305	75.28	27	11.141	118	66.32	59	11.677	138	72.25	35	13.05	61	59.99	50
30.2	16.602	276	75.01	71	11.023	105	65.73	71	11.539	120	72.60	15	12.44	56	59.49	100
June 9.2	16.326	236	74.30	112	10.918	88	65.02	80	11.419	100	72.75	1	11.88	50	58.49	148
19.2	16.090	191	73.18	149	10.830	66	64.22	87	11.319	75	72.74	21	11.38	42	57.01	191
29.1	15.899	140	71.69	183	10.764	46	63.35	91	11.244	50	72.53	35	10.96	34	55.10	230
July 9.1	15.759	88	69.86	214	10.718	22	62.44	93	11.194	22	72.18	54	10.62	24	52.80	263
19.1	15.671	32	67.72	238	10.696	2	61.51	91	11.172	5	71.64	72	10.38	14	50.17	289
29.1	15.639	25	65.34	259	10.698	29	60.60	85	11.177	35	70.92	86	10.24	1	47.28	312
Aug. 8.0	15.664	82	62.75	274	10.727	54	59.75	74	11.212	66	70.06	102	10.23	7	44.16	324
18.0	15.746	141	60.01	284	10.781	84	59.01	61	11.278	95	69.04	120	10.30	18	40.92	333
28.0	15.887	198	57.17	289	10.865	113	58.40	42	11.373	127	67.84	133	10.48	29	37.59	335
Sept. 6.9	16.085	254	54.28	289	10.978	143	57.98	18	11.500	159	66.51	147	10.77	40	34.24	330
16.9	16.339	311	51.39	284	11.121	175	57.80	8	11.659	192	65.04	161	11.17	49	30.94	318
26.9	16.650	365	48.55	273	11.296	206	57.88	39	11.851	225	63.43	172	11.66	59	27.76	298
Oct. 6.9	17.015	416	45.82	255	11.502	235	58.27	71	12.076	257	61.71	181	12.25	67	24.78	275
16.8	17.431	461	43.27	233	11.737	264	58.98	101	12.333	286	59.90	187	12.92	76	22.03	242
26.8	17.892	500	40.94	203	12.001	287	59.99	133	12.619	313	58.03	188	13.68	82	19.61	203
Nov. 5.8	18.392	531	38.91	169	12.288	307	61.32	161	12.932	333	56.15	184	14.50	86	17.58	159
15.8	18.923	548	37.22	128	12.595	317	62.93	184	13.265	346	54.31	176	15.36	90	15.99	110
25.7	19.471	552	35.94	83	12.912	320	64.77	202	13.611	351	52.55	160	16.26	92	14.89	57
Dec. 5.7	20.023	540	35.11	34	13.232	312	66.79	214	13.962	345	50.95	142	17.18	87	14.32	1
15.7	20.563	512	34.77	16	13.544	295	68.93	219	14.307	329	49.53	115	18.05	84	14.33	57
25.6	21.075	466	34.93	64	13.839	268	71.12	216	14.636	301	48.38	86	18.89	76	14.90	110
35.6	21.541		35.57		14.107		73.28		14.937		47.52		19.65		16.00	
Mean Place	14.613		73.85		9.185		47.18		9.588		80.77		10.444		55.72	
Sec δ, Tan δ	1.965		+1.692		1.002		−0.068		1.116		+0.496		3.472		+3.325	
$D_\psi a$, $D_\omega a$	+0.09		+0.09		+0.06		0.00		+0.07		+0.03		+0.11		+0.19	
$D_\psi \delta$, $D_\omega \delta$	−0.3		+0.6		−0.3		+0.5		−0.3		+0.5		−0.3		+0.5	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	19 Leonis Minoris. Mag. 5.2 Right Ascension.		Declination.		φ Argus. Mag. 3.7 Right Ascension.		Declination.		π Leonis. Mag. 4.9 Right Ascension.		Declination.		η Leonis. Mag. 3.6 Right Ascension.		Declination.
	h m 9 52		° ′ +41 25		h m 9 54		° ′ −54 10		h m 9 55		° ′ + 8 25		h m 10 2		° +17
	s		″		s		″		s		″		s		″
Jan. 0.6	46.029		72.80		3.450		51.08		57.991		49.12		56.968		75.99
10.6	46.358	329	72.81	1	3.778	328	54.49	341	58.254	263	47.52	160	57.246	278	74.77
20.6	46.636	278	73.23	42	4.041	263	58.10	361	58.478	224	46.12	140	57.484	238	73.81
30.6	46.858	222	74.01	78	4.235	194	61.84	374	58.657	179	44.97	115	57.677	193	73.15
Feb. 9.5	47.018	160	75.12	111	4.355	120	65.58	374	58.788	131	44.07	90	57.820	143	72.77
19.5	47.111	93	76.48	136	4.401	46	69.23	365	58.868	80	43.44	63	57.910	90	72.67
Mar. 1.5	47.141	30	78.02	154	4.378	23	72.72	349	58.899	31	43.04	40	57.950	40	72.82
11.4	47.110	31	79.68	166	4.291	87	75.97	325	58.886	13	42.87	17	57.944	6	73.16
21.4	47.027	83	81.34	166	4.145	146	78.91	294	58.834	52	42.89	2	57.896	48	73.67
31.4	46.899	128	82.93	159	3.953	192	81.49	258	58.750	84	43.09	20	57.814	82	74.28
Apr. 10.4	46.737	162	84.41	148	3.724	229	83.67	218	58.642	108	43.40	31	57.704	110	74.98
20.3	46.551	186	85.68	127	3.465	259	85.40	173	58.517	125	43.80	40	57.577	127	75.69
30.3	46.353	198	86.72	104	3.188	277	86.66	126	58.384	133	44.27	47	57.440	137	76.38
May 10.3	46.151	202	87.47	75	2.901	287	87.44	78	58.250	134	44.79	52	57.301	139	77.03
20.3	45.956	195	87.94	47	2.613	288	87.72	28	58.120	130	45.33	54	57.165	136	77.62
30.2	45.774	182	88.08	14	2.332	281	87.51	21	58.002	118	45.87	54	57.039	126	78.13
June 9.2	45.613	161	87.91	17	2.065	267	86.81	70	57.896	106	46.40	53	56.927	112	78.54
19.2	45.476	137	87.45	46	1.820	245	85.65	116	57.807	89	46.91	51	56.831	96	78.84
29.1	45.367	109	86.68	77	1.602	218	84.06	159	57.739	68	47.38	47	56.756	75	79.02
July 9.1	45.291	76	85.66	102	1.416	186	82.08	198	57.691	48	47.81	43	56.701	55	79.09
19.1	45.248	43	84.38	128	1.270	146	79.79	229	57.667	24	48.16	35	56.671	30	79.04
29.1	45.240	8	82.88	150	1.169	101	77.22	257	57.666	1	48.42	26	56.664	7	78.83
Aug. 8.0	45.268	28	81.18	170	1.117	52	74.49	273	57.691	25	48.58	16	56.685	21	78.49
18.0	45.332	64	79.31	187	1.120	3	71.67	282	57.741	50	48.61	3	56.731	46	78.00
28.0	45.433	101	77.29	202	1.178	58	68.87	280	57.820	79	48.48	13	56.806	75	77.33
Sept. 7.0	45.571	138	75.14	215	1.297	119	66.18	269	57.928	108	48.16	32	56.912	106	76.49
16.9	45.749	178	72.91	223	1.476	179	63.72	246	58.066	138	47.65	51	57.047	135	75.48
26.9	45.966	217	70.63	228	1.717	241	61.58	214	58.236	170	46.91	74	57.216	169	74.27
Oct. 6.9	46.221	255	68.33	230	2.014	297	59.86	172	58.438	202	45.95	96	57.417	201	72.89
16.8	46.514	293	66.06	227	2.365	351	58.66	120	58.669	231	44.75	120	57.650	233	71.34
26.8	46.840	326	63.86	220	2.762	397	58.01	65	58.930	261	43.34	141	57.914	264	69.64
Nov. 5.8	47.200	360	61.80	206	3.194	432	57.98	3	59.216	286	41.73	161	58.204	290	67.84
15.8	47.581	381	59.92	188	3.650	456	58.56	58	59.524	308	39.98	175	58.518	314	65.97
25.7	47.977	396	58.28	164	4.118	468	59.79	123	59.844	320	38.11	187	58.846	328	64.0
Dec. 5.7	48.381	404	56.94	134	4.580	462	61.60	181	60.168	324	36.19	192	59.181	335	62.24
15.7	48.779	398	55.94	100	5.022	442	63.97	237	60.489	321	34.29	190	59.513	332	60.5
25.7	49.160	381	55.33	61	5.431	409	66.79	282	60.794	305	32.46	183	59.831	318	58.9
35.6	49.509	349	55.12	21	5.792	361	69.99	320	61.075	281	30.77	169	60.125	294	57.5
Mean Place	43.766		91.54		0.964		55.33		56.064		60.29		55.041		89.5
Sec δ, Tan δ	1.334		+0.883		1.709		−1.386		1.011		+0.148		1.046		+0.3
$D_{\psi}a$, $D_{\omega}a$	+0.07		+0.05		+0.04		−0.08		+0.06		+0.01		+0.06		+0.0
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.3		+0.5		−0.3		+0.5		−0.3		+0.5		−0.3		+0.5

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	α Leonis. (*Regulus*.) Mag. 1.3				λ Hydræ. Mag. 3.8				*q* Velorum. Mag. 4.1				32 Ursæ Majoris. Mag. 5.7			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 10 4		° ′ +12 21		h m 10 6		° ′ −11 57		h m 10 11		° ′ −41 43		h m 10 12		° ′ +65 30
	s		″		s		″		s		″		s		″	
Jan. 0.6	5.516	272	36.61	145	40.230	263	16.86	246	22.021	303	10.49	317	13.20	54	23.97	89
10.6	5.788	235	35.16	121	40.493	225	19.32	240	22.324	255	13.66	334	13.74	47	24.86	140
20.6	6.023	189	33.95	95	40.718	181	21.72	228	22.579	199	17.00	342	14.21	38	26.26	184
30.6	6.212	139	33.00	66	40.899	132	24.00	209	22.778	140	20.42	340	14.59	28	28.10	220
Feb. 9.5	6.351	90	32.34	42	41.031	84	26.09	189	22.918	81	23.82	330	14.87	17	30.30	246
19.5	6.441	40	31.92	15	41.115	35	27.98	163	22.999	24	27.12	311	15.04	5	32.76	263
Mar. 1.5	6.481	— 6	31.77	— 6	41.150	— 8	29.61	139	23.023	— 30	30.23	289	15.09	— 5	35.39	266
11.5	6.475	45	31.83	26	41.142	46	31.00	111	22.993	77	33.12	258	15.04	14	38.05	258
21.4	6.430	80	32.09	38	41.096	80	32.11	85	22.916	117	35.70	225	14.90	24	40.63	241
31.4	6.350	104	32.47	49	41.016	102	32.96	58	22.799	148	37.95	189	14.66	32	43.04	213
Apr. 10.4	6.246	123	32.96	56	40.914	122	33.54	34	22.651	173	39.84	148	14.34	36	45.17	177
20.3	6.123	132	33.52	59	40.792	130	33.88	10	22.478	189	41.32	107	13.98	40	46.94	137
30.3	5.991	135	34.11	59	40.662	134	33.98	— 12	22.289	198	42.39	65	13.58	42	48.31	90
May 10.3	5.856	131	34.70	57	40.528	132	33.86	35	22.091	200	43.04	21	13.16	42	49.21	42
20.3	5.725	122	35.27	54	40.396	125	33.51	54	21.891	197	43.25	— 22	12.74	41	49.63	— 7
30.2	5.603	110	35.81	49	40.271	114	32.97	73	21.694	187	43.03	63	12.33	37	49.56	56
June 9.2	5.493	94	36.30	42	40.157	100	32.24	89	21.507	173	42.40	104	11.96	34	49.00	103
19.2	5.399	74	36.72	36	40.057	83	31.35	102	21.334	153	41.36	140	11.62	30	47.97	146
29.2	5.325	54	37.08	25	39.974	64	30.33	113	21.181	131	39.96	174	11.32	24	46.51	185
July 9.1	5.271	30	37.33	17	39.910	43	29.20	121	21.050	103	38.22	201	11.08	19	44.66	223
19.1	5.241	8	37.50	6	39.867	19	27.99	124	20.947	72	36.21	223	10.89	12	42.43	253
29.1	5.233	— 18	37.56	— 7	39.848	— 5	26.75	123	20.875	38	33.98	237	10.77	5	39.90	277
Aug. 8.0	5.251	43	37.49	22	39.853	33	25.52	114	20.837	0	31.61	243	10.72	— 2	37.13	298
18.0	5.294	72	37.27	37	39.886	62	24.38	104	20.837	43	29.18	242	10.74	10	34.15	312
28.0	5.366	101	36.90	55	39.948	91	23.34	86	20.880	88	26.76	229	10.84	17	31.03	319
Sept. 7.0	5.467	132	36.35	76	40.039	125	22.48	62	20.968	134	24.47	208	11.01	23	27.84	322
16.9	5.599	164	35.59	95	40.164	159	21.86	34	21.102	182	22.39	178	11.24	31	24.62	317
26.9	5.763	197	34.64	117	40.323	191	21.52	3	21.284	228	20.61	140	11.55	37	21.45	306
Oct. 6.9	5.960	227	33.47	136	40.514	226	21.49	— 34	21.512	273	19.21	92	11.92	45	18.39	289
16.9	6.187	259	32.11	156	40.740	257	21.83	71	21.785	314	18.29	42	12.37	51	15.50	266
26.8	6.446	284	30.55	171	40.997	283	22.54	109	22.099	348	17.87	— 14	12.88	56	12.84	235
Nov. 5.8	6.730	308	28.84	182	41.280	306	23.63	143	22.447	372	18.01	71	13.44	61	10.49	197
15.8	7.038	322	27.02	189	41.586	319	25.06	177	22.819	388	18.72	128	14.05	64	8.52	154
25.7	7.360	329	25.13	190	41.905	325	26.83	203	23.207	391	20.00	180	14.69	66	6.98	104
Dec. 5.7	7.689	326	23.23	185	42.230	321	28.86	224	23.598	382	21.80	228	15.35	65	5.94	52
15.7	8.015	311	21.38	174	42.551	305	31.10	237	23.980	360	24.08	269	16.00	62	5.42	— 4
25.7	8.326	288	19.64	155	42.856	281	33.47	244	24.340	326	26.77	301	16.62	59	5.46	58
35.6	8.614		18.09		43.137		35.91		24.666		29.78		17.21		6.04	
Mean Place	3.617		48.93		38.353		11.34		19.913		12.88		10.218		47.09	
Sec δ, Tan δ	1.024		+0.219		1.022		−0.212		1.340		−0.892		2.412		+2.195	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		+0.01		+0.06		−0.01		+0.05		−0.05		+0.09		+0.13	
$D_\psi\delta$, $D_\omega\delta$	−0.3		+0.5		−0.3		+0.5		−0.4		+0.5		−0.4		+0.5	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ζ Leonis. Mag. 3.6				λ Ursæ Majoris. Mag. 3.5				γ Leonis pr. Mag. 2.6				μ Ursæ Majoris. Mag. 3.2			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 10 12		° ′ +23 48		h m 10 12		° ′ +43 18		h m 10 15		° ′ +20 14		h m 10 17		° ′ +41 33	
	s		″		s		″		s		″		s		″	
Jan. 0.7	13.234	294	61.92	97	15.297	350	50.27	5	32.431	291	51.78	112	32.686	349	66.88	[illegible]
10.6	13.528	255	60.95	63	15.647	304	50.22	— 38	32.722	253	50.66	85	33.035	304	66.72	— [illegible]
20.6	13.783	209	60.32	31	15.951	248	50.60	78	32.975	208	49.81	54	33.339	250	66.99	[illegible]
30.6	13.992	158	60.01	0	16.199	186	51.38	114	33.183	159	49.27	22	33.589	189	67.66	[illegible]
Feb. 9.5	14.150	105	60.01	30	16.385	120	52.52	142	33.342	107	49.05	— 6	33.778	126	68.70	[illegible]
19.5	14.255	51	60.31	54	16.505	55	53.94	166	33.449	55	49.11	32	33.904	61	70.04	[illegible]
Mar. 1.5	14.306	2	60.85	74	16.560	— 9	55.60	177	33.504	6	49.43	53	33.965	— 1	71.62	[illegible]
11.5	14.308	— 43	61.59	88	16.551	65	57.37	182	33.510	— 37	49.96	70	33.964	56	73.34	[illegible]
21.4	14.265	80	62.47	96	16.486	113	59.19	178	33.473	73	50.66	79	33.908	103	75.11	[illegible]
31.4	14.185	109	63.43	98	16.373	152	60.97	165	33.400	101	51.45	85	33.805	141	76.87	[illegible]
Apr. 10.4	14.076	129	64.41	96	16.221	179	62.62	147	33.299	123	52.30	85	33.664	171	78.51	[illegible]
20.4	13.947	141	65.37	89	16.042	197	64.09	122	33.176	134	53.15	82	33.493	187	79.99	[illegible]
30.3	13.806	146	66.26	78	15.845	204	65.31	94	33.042	139	53.97	75	33.306	197	81.24	[illegible]
May 10.3	13.660	145	67.04	65	15.641	203	66.25	62	32.903	138	54.72	64	33.109	195	82.23	[illegible]
20.3	13.515	136	67.69	50	15.438	194	66.87	29 —	32.765	131	55.36	54	32.914	188	82.91	[illegible]
30.2	13.379	122	68.19	34	15.244	178	67.16	4	32.634	117	55.90	41	32.726	174	83.26	4
June 9.2	13.257	107	68.53	15	15.066	155	67.12	37	32.517	103	56.31	25	32.552	152	83.30	— [illegible]
19.2	13.150	87	68.68	— 1	14.911	129	66.75	70	32.414	85	56.56	12	32.400	129	83.00	[illegible]
29.2	13.063	64	68.67	19	14.782	102	66.05	100	32.329	63	56.68	— 4	32.271	102	82.39	[illegible]
July 9.1	12.999	42	68.48	37	14.680	68	65.05	129	32.266	42	56.64	21	32.169	70	81.48	[illegible]
19.1	12.957	16	68.11	53	14.612	35	63.76	154	32.224	17	56.43	35	32.099	40	80.29	[illegible]
29.1	12.941	— 10	67.58	73	14.577	1	62.22	177	32.207	— 8	56.08	52	32.059	6	78.84	[illegible]
Aug. 8.0	12.951	38	66.85	89	14.576	— 36	60.45	197	32.215	36	55.56	69	32.053	— 30	77.15	[illegible]
18.0	12.989	68	65.96	106	14.612	75	58.48	215	32.251	64	54.87	86	32.083	67	75.26	[illegible]
28.0	13.057	98	64.90	125	14.687	115	56.33	229	32.315	93	54.01	104	32.150	106	73.17	[illegible]
Sept. 7.0	13.155	132	63.65	140	14.802	154	54.04	239	32.408	126	52.97	123	32.256	145	70.95	[illegible]
16.9	13.287	165	62.25	158	14.956	196	51.65	246	32.534	159	51.74	140	32.401	185	68.61	[illegible]
26.9	13.452	200	60.67	171	15.152	238	49.19	249	32.693	192	50.34	157	32.586	228	66.18	[illegible]
Oct. 6.9	13.652	233	58.96	183	15.390	278	46.70	247	32.885	227	48.77	171	32.814	268	63.71	[illegible]
16.9	13.885	266	57.13	193	15.668	318	44.23	240	33.112	259	47.06	184	33.082	307	61.24	[illegible]
26.8	14.151	296	55.20	198	15.986	352	41.83	227	33.371	288	45.22	192	33.389	342	58.83	[illegible]
Nov. 5.8	14.447	320	53.22	199	16.338	381	39.56	207	33.659	314	43.30	197	33.731	371	56.53	[illegible]
15.8	14.767	337	51.23	192	16.719	402	37.49	182	33.973	331	41.33	195	34.102	394	54.42	[illegible]
25.7	15.104	347	49.31	181	17.121	413	35.67	151	34.304	340	39.38	188	34.496	405	52.53	[illegible]
Dec. 5.7	15.451	345	47.50	163	17.534	411	34.16	114	34.644	340	37.50	174	34.901	405	50.94	[illegible]
15.7	15.796	334	45.87	142	17.945	398	33.02	73	34.984	329	35.76	155	35.306	393	49.72	[illegible]
25.7	16.130	310	44.45	112	18.343	371	32.29	31	35.313	307	34.21	130	35.699	367	48.69	[illegible]
35.6	16.440		43.33		18.714		31.98		35.620		32.91		36.066		48.48	
Mean Place	11.322		77.39		13.157		70.15		30.561		66.41		30.616		86.65	
Sec δ, Tan δ	1.093		+0.441		1.374		+0.943		1.066		+0.369		1.344		+0.897	
$D_\psi\alpha$, $D_\omega\alpha$	+0.07		+0.03		+0.07		+0.06		+0.07		+0.02		+0.07		+0.05	
$D_\psi\delta$, $D_\omega\delta$	−0.4		+0.5		−0.4		+0.5		−0.4		+0.4		−0.4		+0.4	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 H. Ursæ Majoris. Mag. 4.9 Right Ascension.		Declination.		μ Hydræ. Mag. 4.1 Right Ascension.		Declination.		31 Leonis Minoris. Mag. 4.4 Right Ascension.		Declination.		α Antliæ. Mag. 4.4 Right Ascension.		Declination.	
	h m 10 18		° ′ +65 57		h m 10 22		° ′ −16 25		h m 10 23		° ′ +37 6		h m 10 23		° ′ −30 39	
	s		″		s		″		s		″		s		″	
Jan. 0.7	21.79	56	72.53	85	12.162	278	24.38	258	14.292	334	62.69	43	28.515	292	19.19	293
10.6	22.35	49	73.38	136	12.440	239	26.96	256	14.626	293	62.26	2	28.807	250	22.12	304
20.6	22.84	40	74.74	181	12.679	195	29.52	248	14.919	243	62.24	38	29.057	203	25.16	304
30.6	23.24	30	76.55	219	12.874	148	32.00	235	15.162	186	62.62	75	29.260	152	28.20	298
Feb. 9.5	23.54	17	78.74	246	13.022	99	34.35	213	15.348	127	63.37	106	29.412	99	31.18	286
19.5	23.71	7	81.20	265	13.121	51	36.48	192	15.475	67	64.43	130	29.511	47	34.04	266
Mar. 1.5	23.78	3	83.85	268	13.172	6	38.40	166	15.542	10	65.73	148	29.558	1	36.70	242
11.5	23.75	14	86.53	262	13.178	34	40.06	139	15.552	43	67.21	157	29.557	44	39.12	213
21.4	23.61	24	89.15	246	13.144	67	41.45	111	15.509	87	68.78	159	29.513	81	41.25	183
31.4	23.37	30	91.61	219	13.077	93	42.56	84	15.422	124	70.37	153	29.432	110	43.08	149
Apr. 10.4	23.07	36	93.80	185	12.984	113	43.40	55	15.298	150	71.90	140	29.322	131	44.57	114
20.4	22.71	41	95.65	143	12.871	126	43.95	29	15.148	168	73.30	121	29.191	146	45.71	79
30.3	22.30	42	97.08	98	12.745	131	44.24	4	14.980	176	74.51	100	29.045	154	46.50	44
May 10.3	21.88	43	98.06	49	12.614	133	44.28	22	14.804	176	75.51	73	28.891	158	46.94	8
20.3	21.45	41	98.55	2	12.481	128	44.06	45	14.628	170	76.24	47	28.733	154	47.02	28
30.2	21.04	40	98.53	49	12.353	120	43.61	68	14.458	157	76.71	16	28.579	148	46.74	62
June 9.2	20.64	36	98.04	98	12.233	109	42.93	87	14.301	140	76.87	13	28.431	136	46.12	94
19.2	20.28	31	97.06	140	12.124	94	42.06	105	14.161	118	76.74	40	28.295	121	45.18	123
29.2	19.97	25	95.66	183	12.030	77	41.01	121	14.043	95	76.34	70	28.174	103	43.95	148
July 9.1	19.72	20	93.83	220	11.953	58	39.80	130	13.948	67	75.64	95	28.071	82	42.47	171
19.1	19.52	14	91.63	251	11.895	36	38.50	137	13.881	39	74.69	120	27.989	57	40.76	187
29.1	19.38	7	89.12	277	11.859	11	37.13	139	13.842	8	73.49	143	27.932	28	38.89	196
Aug. 8.1	19.31	0	86.35	299	11.848	16	35.74	136	13.834	24	72.06	164	27.904	2	36.93	199
18.0	19.31	8	83.36	313	11.864	44	34.38	126	13.858	59	70.42	183	27.906	36	34.94	195
28.0	19.39	15	80.23	323	11.908	76	33.12	108	13.917	92	68.59	199	27.942	74	32.99	183
Sept. 7.0	19.54	23	77.00	326	11.984	111	32.04	88	14.009	131	66.60	214	28.016	113	31.16	160
16.9	19.77	30	73.74	322	12.095	145	31.16	60	14.140	170	64.46	225	28.129	154	29.56	133
26.9	20.07	37	70.52	313	12.240	181	30.56	27	14.310	209	62.21	233	28.283	195	28.23	98
Oct. 6.9	20.44	44	67.39	296	12.421	218	30.29	10	14.519	248	59.88	236	28.478	234	27.25	54
16.9	20.88	50	64.43	273	12.639	252	30.39	48	14.767	285	57.52	235	28.712	273	26.71	9
26.8	21.38	56	61.70	242	12.891	281	30.87	89	15.052	320	55.17	229	28.985	306	26.62	40
Nov. 5.8	21.94	61	59.28	204	13.172	306	31.76	129	15.372	350	52.88	216	29.291	331	27.02	91
15.8	22.55	65	57.24	161	13.478	322	33.05	166	15.722	370	50.72	197	29.622	349	27.93	139
25.8	23.20	66	55.63	112	13.800	331	34.71	196	16.092	383	48.75	171	29.971	356	29.32	184
Dec. 5.7	23.86	66	54.51	58	14.131	328	36.67	224	16.475	385	47.04	142	30.327	351	31.16	224
15.7	24.52	64	53.93	3	14.459	316	38.91	241	16.860	375	45.62	105	30.678	338	33.40	256
25.7	25.16	60	53.90	53	14.775	293	41.32	254	17.235	351	44.57	66	31.016	309	35.96	279
35.6	25.76		54.43		15.068		43.86		17.586		43.91		31.325		38.75	
Mean Place	18.879		95.99		10.338		20.32		12.334		81.62		26.600		19.18	
Sec δ, Tan δ	2.456		+2.243		1.043		−0.295		1.254		+0.757		1.162		−0.593	
$D_\psi a$, $D_\omega a$	+0.09		+0.14		+0.06		−0.02		+0.07		+0.05		+0.05		−0.04	
$D_\psi \delta$, $D_\omega \delta$	−0.4		+0.4		−0.4		+0.4		−0.4		+0.4		−0.4		+0.4	

5934°—1919——26

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	36 Ursæ Majoris. Mag. 4.8 Right Ascension.		36 Ursæ Majoris. Declination.		9 H. Draconis. Mag. 5.0 Right Ascension.		9 H. Draconis. Declination.	
	h m 10 25		° ′ +56 23		h m 10 28		° ′ +76 7	
	s		″		s		″	
Jan. 0.7	29.618		24.36		19.02		26.46	
10.6	30.063	445	24.74	38	19.93	91	27.54	108
20.6	30.453	390	25.63	89	20.72	79	29.17	163
30.6	30.775	322	26.97	134	21.37	65	31.28	211
Feb. 9.6	31.019	244	28.71	174	21.85	48	33.77	249
19.5	31.183	164	30.76	205	22.16	31	36.53	276
Mar. 1.5	31.261	78	33.02	226	22.26	10	39.46	293
11.5	31.257	4	35.39	237	22.21	5	42.43	297
21.4	31.178	79	37.76	237	21.97	24	45.31	288
31.4	31.032	146	40.04	228	21.57	40	48.00	269
Apr. 10.4	30.831	201	42.12	208	21.04	53	50.37	237
20.4	30.588	243	43.94	182	20.40	64	52.35	198
30.3	30.316	272	45.41	147	19.69	71	53.88	153
May 10.3	30.028	288	46.50	109	18.93	76	54.90	102
20.3	29.736	292	47.18	68	18.14	79	55.37	47
30.3	29.450	286	47.42	24	17.36	78	55.30	7
June 9.2	29.181	269	47.22	20	16.61	75	54.69	61
19.2	28.938	243	46.59	63	15.91	70	53.56	113
29.2	28.725	213	45.55	104	15.28	63	51.94	162
July 9.1	28.550	175	44.13	142	14.74	54	49.87	207
19.1	28.415	135	42.36	177	14.32	42	47.41	246
29.1	28.325	90	40.27	209	13.99	33	44.62	279
Aug. 8.1	28.281	44	37.91	236	13.78	21	41.53	309
18.0	28.287	6	35.32	259	13.70	8	38.24	329
28.0	28.344	57	32.56	276	13.75	5	34.80	344
Sept. 7.0	28.454	110	29.66	290	13.92	17	31.26	354
17.0	28.617	163	26.69	297	14.21	29	27.72	354
26.9	28.836	219	23.69	300	14.65	44	24.26	346
Oct. 6.9	29.110	274	20.71	298	15.20	55	20.92	334
16.9	29.438	328	17.84	287	15.87	67	17.79	313
26.8	29.817	379	15.12	272	16.65	78	14.94	285
Nov. 5.8	30.242	425	12.62	250	17.54	89	12.44	250
15.8	30.706	464	10.43	219	18.49	95	10.37	207
25.8	31.199	493	8.59	184	19.51	102	8.79	158
Dec. 5.7	31.709	510	7.18	141	20.55	104	7.76	103
15.7	32.221	512	6.23	95	21.61	106	7.32	44
25.7	32.720	499	5.81	42	22.63	102	7.47	15
35.7	33.187	467	5.89	8	23.58	95	8.21	74
Mean Place	27.290		46.95		15.102		51.11	
Sec δ, Tan δ	1.807		+1.504		4.170		+4.049	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.08		+0.09		+0.10		+0.25	
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.4		+0.4		−0.4		+0.4	

Washington Mean Time.	ρ Leonis. Mag. 3.8 Right Ascension.		ρ Leonis. Declination.		33 Sextantis. Mag. 6.4 Right Ascension.		33 Sextantis. Declination.
	h m 10 28		° ′ + 9 42		h m 10 37		° −1
	s		″		s		″
Jan. 0.7	34.642		74.17		18.652		63.00
10.6	34.928	286	72.53	164	18.937	285	65.08
20.6	35.179	251	71.10	143	19.187	250	67.04
30.6	35.387	208	69.94	116	19.397	210	68.81
Feb. 9.6	35.550	163	69.05	89	19.563	166	70.34
19.5	35.663	113	68.44	61	19.681	118	71.64
Mar. 1.5	35.729	66	68.09	35	19.751	70	72.67
11.5	35.748	19	68.00	9	19.778	27	73.45
21.4	35.726	22	68.11	11	19.764	14	74.00
31.4	35.671	55	68.40	29	19.717	47	74.30
Apr. 10.4	35.586	85	68.82	42	19.641	76	74.42
20.4	35.482	104	69.33	51	19.546	95	74.37
30.3	35.362	120	69.91	58	19.436	110	74.14
May 10.3	35.238	124	70.52	61	19.318	118	73.79
20.3	35.113	125	71.13	61	19.199	119	73.33
30.3	34.994	119	71.73	60	19.083	116	72.78
June 9.2	34.882	112	72.30	57	18.972	111	72.15
19.2	34.782	100	72.82	52	18.871	101	71.46
29.2	34.698	84	73.28	46	18.783	88	70.74
July 9.1	34.631	67	73.67	39	18.710	73	70.00
19.1	34.582	49	73.97	30	18.654	56	69.27
29.1	34.556	26	74.15	18	18.617	37	68.58
Aug. 8.1	34.551	5	74.21	6	18.602	15	67.95
18.0	34.571	20	74.13	8	18.610	8	67.42
28.0	34.618	47	73.88	25	18.646	36	67.02
Sept. 7.0	34.694	76	73.46	42	18.711	65	66.81
17.0	34.801	107	72.82	64	18.806	95	66.80
26.9	34.940	139	71.97	85	18.934	128	67.04
Oct. 6.9	35.114	174	70.89	108	19.098	164	67.54
16.9	35.322	208	69.59	130	19.297	199	68.33
26.8	35.562	240	68.08	151	19.529	232	69.42
Nov. 5.8	35.833	271	66.38	170	19.794	265	70.78
15.8	36.130	297	64.53	185	20.084	290	72.41
25.8	36.445	315	62.57	196	20.395	311	74.26
Dec. 5.7	36.772	327	60.57	200	20.718	323	76.26
15.7	37.100	328	58.59	198	21.042	324	78.39
25.7	37.420	320	56.70	189	21.359	317	80.54
35.7	37.719	299	54.95	175	21.656	297	82.64
Mean Place	32.882		85.99		16.940		54.52
Sec δ, Tan δ	1.015		+0.171		1.000		−0.02
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.06		+0.01		+0.06		0.00
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.4		+0.4		−0.4		+0.4

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

...ington ...Time.	χ Leonis. Mag. 4.7 Right Ascension.		Declination.		p^4 Leonis. Mag. 5.7 Right Ascension.		Declination.	
	h m		° ′		h m		° ′	
	11 0		+ 7 45		11 2		+ 2 23	
	s		″		s		″	
... 0.7	51.975	300	76.26	182	47.940	299	34.72	199
10.7	52.275	272	74.44	159	48.239	269	32.73	183
20.6	52.547	233	72.85	136	48.508	233	30.90	161
30.6	52.780	190	71.49	106	48.741	189	29.29	138
b. 9.6	52.970	144	70.43	77	48.930	143	27.91	110
19.5	53.114	96	69.66	51	49.073	97	26.81	83
r. 1.5	53.210	51	69.15	22	49.170	53	25.98	56
11.5	53.261	10	68.93	0	49.223	12	25.42	31
21.5	53.271 —	27	68.93	21	49.235 —	25	25.11	11
31.4	53.244	57	69.14	37	49.210	53	25.00 —	8
r. 10.4	53.187	81	69.51	49	49.157	79	25.08	26
20.4	53.106	98	70.00	57	49.078	94	25.34	37
30.4	53.008	109	70.57	63	48.984	106	25.71	47
y 10.3	52.899	114	71.20	66	48.878	112	26.18	54
20.3	52.785	116	71.86	66	48.766	114	26.72	60
30.3	52.669	113	72.52	63	48.652	110	27.32	63
ne 9.2	52.556	106	73.15	60	48.542	105	27.95	64
19.2	52.450	96	73.75	55	48.437	96	28.59	64
29.2	52.354	85	74.30	47	48.341	85	29.23	62
ly 9.2	52.269	69	74.77	39	48.256	70	29.85	57
19.1	52.200	53	75.16	27	48.186	54	30.42	51
29.1	52.147	33	75.43	17	48.132	36	30.93	42
g. 8.1	52.114	11	75.60	1	48.096	13	31.35	31
18.1	52.103 —	14	75.61 —	16	48.083 —	12	31.66	15
28.0	52.117	41	75.45	33	48.095	39	31.81 —	1
pt. 7.0	52.158	74	75.12	54	48.134	70	31.80	23
17.0	52.232	107	74.58	78	48.204	104	31.57	44
26.9	52.339	141	73.80	100	48.308	139	31.13	71
t. 6.9	52.480	179	72.80	125	48.447	177	30.42	97
16.9	52.659	216	71.55	148	48.624	214	29.45	124
26.9	52.875	251	70.07	169	48.838	248	28.21	149
v. 5.8	53.126	280	68.38	186	49.086	278	26.72	172
15.8	53.406	305	66.52	200	49.364	303	25.00	190
25.8	53.711	322	64.52	207	49.667	319	23.10	204
c. 5.8	54.033	328	62.45	208	49.986	327	21.06	212
15.7	54.361	325	60.37	203	50.313	323	18.94	210
25.7	54.686	311	58.34	190	50.636	309	16.84	205
35.7	54.997		56.44		50.945		14.79	
...n Place	50.397		87.54		46.368		44.26	
..., Tan δ	1.009		+0.136		1.001		+0.042	
$D_{\psi}\alpha$	+0.06		+0.01		+0.06		0.00	
$D_{\psi}\delta$	−0.4		+0.3		−0.4		+0.2	

...ington ...Time.	ψ Ursae Majoris. Mag. 3.2 Right Ascension.		Declination.		β Crateris. Mag. 4.5 Right Ascension.		Declination.	
	h m		° ′		h m		° ′	
	11 5		+44 55		11 7		−22 23	
	s		″		s		″	
... 0.7	8.679	390	56.18	49	41.960	312	2.07	260
10.7	9.069	356	55.69 —	3	42.272	281	4.67	266
20.6	9.425	308	55.72	51	42.553	240	7.33	265
30.6	9.733	253	56.23	94	42.793	196	9.98	258
b. 9.6	9.986	189	57.17	134	42.989	149	12.56	244
19.5	10.175	126	58.51	166	43.138	101	15.00	227
r. 1.5	10.301	61	60.17	189	43.239	56	17.27	203
11.5	10.362	0	62.06	203	43.295	13	19.30	180
21.5	10.362	54	64.09	208	43.308 —	24	21.10	152
31.4	10.308	101	66.17	203	43.284	54	22.62	124
r. 10.4	10.207	139	68.20	190	43.230	81	23.86	97
20.4	10.068	168	70.10	170	43.149	99	24.83	68
30.4	9.900	188	71.80	143	43.050	113	25.51	40
y 10.3	9.712	198	73.23	112	42.937	122	25.91	11
20.3	9.514	201	74.35	78	42.815	126	26.02 —	16
30.3	9.313	198	75.13	43	42.689	125	25.86	41
ne 9.2	9.115	187	75.56	4	42.564	123	25.45	67
19.2	8.928	171	75.60 —	34	42.441	114	24.78	89
29.2	8.757	153	75.26	70	42.327	106	23.89	110
ly 9.2	8.604	127	74.56	104	42.221	92	22.79	127
19.1	8.477	103	73.52	137	42.129	76	21.52	139
29.1	8.374	71	72.15	169	42.053	55	20.13	147
g. 8.1	8.303	38	70.46	195	41.998	30	18.66	150
18.1	8.265	2	68.51	221	41.968	4	17.16	147
28.0	8.263 —	37	66.30	241	41.964 —	29	15.69	138
pt. 7.0	8.300	79	63.89	260	41.993	65	14.31	121
17.0	8.379	124	61.29	272	42.058	104	13.10	98
26.9	8.503	171	58.57	281	42.162	144	12.12	69
t. 6.9	8.674	218	55.76	285	42.306	185	11.43	33
16.9	8.892	266	52.91	282	42.491	226	11.10 —	5
26.9	9.158	310	50.09	273	42.717	264	11.15	46
v. 5.8	9.468	351	47.36	256	42.981	297	11.61	89
15.8	9.819	383	44.80	234	43.278	322	12.50	130
25.8	10.202	408	42.46	203	43.600	338	13.80	168
c. 5.8	10.610	419	40.43	165	43.938	345	15.48	202
15.7	11.029	420	38.78	122	44.283	340	17.50	228
25.7	11.449	404	37.56	76	44.623	324	19.78	248
35.7	11.853		36.80		44.947		22.26	
...n Place	7.006		77.80		40.321		0.66	
..., Tan δ	1.412		+0.997		1.082		−0.412	
$D_{\psi}\alpha$	+0.07		+0.06		+0.06		−0.03	
$D_{\psi}\delta$	−0.4		+0.2		−0.4		+0.2	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Leonis. Mag. 2.6				θ Leonis. Mag. 3.4				ν Ursæ Majoris. Mag. 3.7				δ Crateris. Mag. 3.8		
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.
	h m 11 9		° ′ +20 57		h m 11 9		° ′ +15 51		h m 11 14		° ′ +33 31		h m 11 15		° −14
	s		″		s		″		s		″		s		″
Jan. 0.7	49.740		48.19		60.983		67.17		8.016		52.52		18.928		28.01
10.7	50.061	321	46.78	141	61.295	312	65.59	158	8.366	350	51.53	99	19.236	308	30.41
20.6	50.352	291	45.71	107	61.580	285	64.30	129	8.685	319	50.99	54	19.515	279	32.82
30.6	50.606	254	44.99	72	61.827	247	63.32	98	8.966	281	50.88	11	19.758	243	35.15
Feb. 9.6	50.815	209	44.64	35	62.031	204	62.69	63	9.197	231	51.19	31	19.957	199	37.36
19.6	50.976	161	44.62	2	62.189	158	62.38	31	9.377	180	51.89	70	20.112	155	39.38
Mar. 1.5	51.088	112	44.92	30	62.298	109	62.36	2	9.501	124	52.91	102	20.221	109	41.20
11.5	51.151	63	45.49	57	62.360	62	62.63	27	9.572	71	54.22	131	20.285	64	42.77
21.5	51.169	18	46.29	80	62.379	19	63.12	49	9.590	18	55.71	149	20.308	23	44.11
31.4	51.147	22	47.23	94	62.359	20	63.80	68	9.563	27	57.31	160	20.295	13	45.17
Apr. 10.4	51.092	55	48.28	105	62.307	52	64.60	80	9.496	67	58.95	164	20.253	42	46.00
20.4	51.008	84	49.37	109	62.228	79	65.47	87	9.397	99	60.56	161	20.184	69	46.57
30.4	50.905	103	50.45	108	62.131	97	66.37	90	9.272	125	62.06	150	20.097	87	46.90
May 10.3	50.787	118	51.47	102	62.020	111	67.26	89	9.132	140	63.39	133	19.996	101	47.01
20.3	50.663	124	52.40	93	61.901	119	68.10	84	8.981	151	64.51	112	19.886	110	46.91
30.3	50.536	127	53.20	80	61.781	120	68.86	76	8.827	154	65.40	89	19.772	114	46.60
June 9.3	50.411	125	53.84	64	61.663	118	69.51	65	8.675	152	66.01	61	19.657	115	46.11
19.2	50.294	117	54.32	48	61.551	112	70.06	55	8.529	146	66.33	32	19.545	112	45.43
29.2	50.184	110	54.61	29	61.447	104	70.46	40	8.393	136	66.37	4	19.439	106	44.61
July 9.2	50.088	96	54.72	11	61.355	92	70.71	25	8.273	120	66.11	26	19.341	98	43.66
19.1	50.006	82	54.64	8	61.277	78	70.82	11	8.169	104	65.57	54	19.255	86	42.61
29.1	49.943	63	54.34	30	61.216	61	70.76	6	8.085	84	64.74	83	19.185	70	41.49
Aug. 8.1	49.898	45	53.84	50	61.174	42	70.51	25	8.025	60	63.63	111	19.131	54	40.34
18.1	49.878	20	53.13	71	61.155	19	70.09	42	7.992	33	62.27	136	19.100	31	39.21
28.0	49.883	5	52.22	91	61.160	5	69.46	63	7.986	6	60.66	161	19.095	5	38.14
Sept. 7.0	49.918	35	51.09	113	61.194	34	68.64	82	8.014	28	58.84	182	19.119	24	37.19
17.0	49.984	66	49.75	134	61.259	65	67.60	104	8.078	64	56.80	204	19.176	57	36.42
27.0	50.086	102	48.21	154	61.359	100	66.35	125	8.180	102	54.60	220	19.268	92	35.88
Oct. 6.9	50.224	138	46.48	173	61.494	135	64.89	146	8.322	142	52.24	236	19.400	132	35.62
16.9	50.401	177	44.57	191	61.668	174	63.22	167	8.507	185	49.77	247	19.573	173	35.67
26.9	50.618	217	42.51	206	61.880	212	61.38	184	8.734	227	47.24	253	19.784	211	36.08
Nov. 5.8	50.871	253	40.35	216	62.128	248	59.39	199	9.002	268	44.70	254	20.033	249	36.85
15.8	51.157	286	38.13	222	62.408	280	57.29	210	9.308	306	42.21	249	20.314	281	37.99
25.8	51.471	314	35.91	222	62.716	308	55.14	215	9.643	335	39.84	237	20.622	308	39.48
Dec. 5.8	51.804	333	33.76	215	63.041	325	53.00	214	10.002	359	37.67	217	20.948	326	41.26
15.7	52.147	343	31.74	202	63.377	336	50.95	205	10.373	371	35.76	191	21.282	334	43.30
25.7	52.490	343	29.91	183	63.712	335	49.03	192	10.745	372	34.16	160	21.613	331	45.52
35.7	52.820	330	28.35	156	64.035	323	47.32	171	11.106	361	32.96	120	21.932	319	47.87
Mean Place	48.213		63.59		59.460		81.01		6.492		71.51		17.371		24.13
Sec δ, Tan δ	1.071		+0.383		1.040		+0.284		1.200		+0.663		1.032		−0.256
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		+0.02		+0.06		+0.02		+0.06		+0.04		+0.06		−0.02
$D_\psi\delta$, $D_\omega\delta$	−0.4		+0.2		−0.4		+0.2		−0.4		+0.2		−0.4		+0.2

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Leonis. (*Denebola.*) Mag. 2.2 Right Ascension.		β Leonis. Declination.		β Virginis. Mag. 3.8 Right Ascension.		β Virginis. Declination.		Groombridge 1830. Mag. 6.5 Right Ascension.		Groombridge 1830. Declination.		γ Ursæ Majoris. Mag. 2.5 Right Ascension.		γ Ursæ Majoris. Declination.	
	h m 11 44		° ′ +15 0		h m 11 46		° ′ + 2 12		h m 11 48		° ′ +38 17		h m 11 49		° ′ +54 7	
	s		″		s		″		s		″		s		″	
Jan. 0.7	57.075	324	76.22	174	29.885	318	67.49	205	20.183	387	40.11	126	35.918	472	78.53	64
10.7	57.399	301	74.48	147	30.203	295	65.44	189	20.570	363	38.85	78	36.390	444	77.89	6
20.7	57.700	269	73.01	113	30.498	265	63.55	168	20.933	329	38.07	29	36.834	401	77.83	53
30.6	57.969	233	71.88	79	30.763	227	61.87	144	21.262	284	37.78	19	37.235	345	78.36	105
Feb. 9.6	58.202	188	71.09	46	30.990	187	60.43	115	21.546	232	37.97	64	37.580	279	79.41	153
19.6	58.390	142	70.63	10	31.177	143	59.28	88	21.778	179	38.61	103	37.859	210	80.94	193
Mar. 1.6	58.532	98	70.53	19	31.320	99	58.40	59	21.957	123	39.64	134	38.069	135	82.87	225
11.5	58.630	54	70.72	45	31.419	58	57.81	33	22.080	68	40.98	160	38.204	61	85.12	244
21.5	58.684	14	71.17	67	31.477	21	57.48	11	22.148	17	42.58	176	38.265	8	87.56	255
31.5	58.698	20	71.84	83	31.498	12	57.37	10	22.165	29	44.34	181	38.257	71	90.11	254
Apr. 10.4	58.678	49	72.67	93	31.486	38	57.47	28	22.136	67	46.15	180	38.186	126	92.65	242
20.4	58.629	73	73.60	98	31.448	60	57.75	41	22.069	98	47.95	168	38.060	171	95.07	223
30.4	58.556	89	74.58	99	31.388	79	58.16	51	21.971	124	49.63	152	37.889	208	97.30	195
May 10.4	58.467	102	75.57	96	31.309	89	58.67	59	21.847	140	51.15	130	37.681	233	99.25	160
20.3	58.365	110	76.53	89	31.220	98	59.26	63	21.707	151	52.45	102	37.448	251	100.85	121
30.3	58.255	115	77.42	80	31.122	103	59.89	66	21.556	157	53.47	71	37.197	259	102.06	78
June 9.3	58.140	114	78.22	66	31.019	103	60.55	67	21.399	157	54.18	38	36.938	259	102.84	34
19.3	58.026	112	78.88	54	30.916	103	61.22	65	21.242	152	54.56	5	36.679	252	103.18	11
29.2	57.914	105	79.42	39	30.813	97	61.87	62	21.090	144	54.61	31	36.427	239	103.07	56
July 9.2	57.809	97	79.81	21	30.716	90	62.49	57	20.946	131	54.30	66	36.188	219	102.51	100
19.2	57.712	86	80.02	4	30.626	80	63.06	50	20.815	113	53.64	99	35.969	196	101.51	141
29.1	57.626	70	80.06	15	30.546	66	63.56	41	20.702	95	52.65	133	35.773	165	100.10	181
Aug. 8.1	57.556	52	79.91	34	30.480	49	63.97	28	20.607	69	51.32	164	35.608	128	98.29	216
18.1	57.504	29	79.57	55	30.431	26	64.25	14	20.538	42	49.68	192	35.480	91	96.13	247
28.1	57.475	4	79.02	77	30.405	2	64.39	2	20.496	9	47.76	219	35.389	45	93.66	275
Sept. 7.0	57.471	27	78.25	98	30.403	28	64.37	23	20.487	27	45.57	242	35.344	4	90.91	297
17.0	57.498	62	77.27	123	30.431	63	64.14	45	20.514	68	43.15	263	35.348	57	87.94	315
27.0	57.560	99	76.04	143	30.494	99	63.69	71	20.582	111	40.52	280	35.405	114	84.79	326
Oct. 7.0	57.659	137	74.61	167	30.593	138	62.98	95	20.693	158	37.72	292	35.519	175	81.53	331
16.9	57.796	180	72.94	186	30.731	180	62.03	123	20.851	206	34.80	300	35.694	236	78.22	329
26.9	57.976	219	71.08	203	30.911	218	60.80	147	21.057	253	31.80	300	35.930	295	74.93	319
Nov. 5.9	58.195	257	69.05	216	31.129	256	59.33	171	21.310	297	28.80	294	36.225	350	71.74	301
15.8	58.452	288	66.89	223	31.385	286	57.62	189	21.607	335	25.86	281	36.575	400	68.73	276
25.8	58.740	314	64.66	225	31.671	311	55.73	204	21.942	366	23.05	259	36.975	440	65.97	240
Dec. 5.8	59.054	329	62.41	219	31.982	325	53.69	214	22.308	387	20.46	231	37.415	468	63.57	199
15.8	59.383	335	60.22	206	32.307	330	51.55	215	22.695	396	18.15	194	37.883	481	61.58	150
25.7	59.718	330	58.16	187	32.637	325	49.40	209	23.091	394	16.21	153	38.364	480	60.08	95
35.7	60.048		56.29		32.962		47.31		23.485		14.68		38.844		59.13	
Mean Place	55.777		89.68		28.561		76.59		18.943		60.49		34.690		102.43	
Sec δ, Tan δ	1.035		+0.268		1.001		+0.038		1.274		+0.790		1.707		+1.383	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		+0.02		+0.06		0.00		+0.06		+0.05		+0.06		+0.09	
$D_\psi\delta$, $D_\omega\delta$	−0.4		+0.1		−0.4		+0.1		−0.4		+0.1		−0.4		0.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	π Virginis. Mag. 4.6 Right Ascension.	diff.	Declination.	diff.	o Virginis. Mag. 4.2 Right Ascension.	diff.	Declination.	diff.	δ Centauri. Mag. 2.9 Right Ascension.	diff.	Declination.	diff.	ε Corvi. Mag. 3.2 Right Ascension.	diff.	Declination.	diff.
	h m 11 56		° ′ + 7 3		h m 12 1		° ′ + 9 10		h m 12 4		° ′ −50 16		h m 12 5		° ′ −22 10	
	s		″		s		″		s		″		s		″	
Jan. 0.7	44.575	322	46.92	196	6.233	324	46.59	193	10.796	442	9.36	227	58.699	338	9.99	231
10.7	44.897	301	44.96	176	6.557	303	44.66	169	11.238	412	11.63	264	59.037	317	12.30	241
20.7	45.198	272	43.20	149	6.860	276	42.97	142	11.650	369	14.27	291	59.354	288	14.71	245
30.6	45.470	237	41.71	121	7.136	240	41.55	112	12.019	320	17.18	313	59.642	251	17.16	241
Feb. 9.6	45.707	195	40.50	91	7.376	199	40.43	79	12.339	264	20.31	324	59.893	208	19.57	232
19.6	45.902	152	39.59	59	7.575	156	39.64	48	12.603	207	23.55	328	60.101	166	21.89	217
Mar. 1.6	46.054	108	39.00	30	7.731	113	39.16	17	12.810	148	26.83	324	60.267	121	24.06	200
11.5	46.162	67	38.70	3	7.844	71	38.99	10	12.958	90	30.07	314	60.388	80	26.06	179
21.5	46.229	29	38.67	21	7.915	32	39.09	35	13.048	39	33.21	296	60.468	43	27.85	154
31.5	46.258	4	38.88	40	7.947	0	39.44	53	13.087	11	36.17	275	60.511	7	29.39	132
Apr. 10.5	46.254	33	39.28	55	7.947	31	39.97	68	13.076	54	38.92	247	60.518	23	30.71	106
20.4	46.221	56	39.83	68	7.916	53	40.65	77	13.022	92	41.39	216	60.495	47	31.77	81
30.4	46.165	75	40.51	73	7.863	74	41.42	83	12.930	126	43.55	182	60.448	69	32.58	57
May 10.4	46.090	88	41.24	77	7.789	88	42.25	85	12.804	155	45.37	144	60.379	85	33.15	31
20.3	46.002	98	42.01	77	7.701	97	43.10	83	12.649	177	46.81	103	60.294	99	33.46	8
30.3	45.904	104	42.78	75	7.604	104	43.93	80	12.472	195	47.84	63	60.195	108	33.54	16
June 9.3	45.800	106	43.53	70	7.500	108	44.73	71	12.277	209	48.47	17	60.087	117	33.38	38
19.3	45.694	106	44.23	64	7.392	108	45.44	65	12.068	216	48.64	25	59.970	119	33.00	59
29.2	45.588	103	44.87	56	7.284	106	46.09	54	11.852	217	48.39	68	59.851	119	32.41	81
July 9.2	45.485	96	45.43	46	7.178	99	46.63	41	11.635	210	47.71	108	59.732	114	31.60	97
19.2	45.389	87	45.89	35	7.079	91	47.04	28	11.425	198	46.63	145	59.618	108	30.63	112
29.2	45.302	74	46.24	20	6.988	79	47.32	13	11.227	178	45.18	180	59.510	96	29.51	123
Aug. 8.1	45.228	60	46.44	7	6.909	62	47.45	3	11.049	149	43.38	206	59.414	78	28.28	128
18.1	45.168	38	46.51	11	6.847	43	47.42	22	10.900	112	41.32	226	59.336	57	27.00	131
28.1	45.130	12	46.40	31	6.804	17	47.20	41	10.788	68	39.06	239	59.279	29	25.69	127
Sept. 7.0	45.118	17	46.09	50	6.787	12	46.79	64	10.720	15	36.67	242	59.250	4	24.42	116
17.0	45.135	49	45.59	74	6.799	44	46.15	86	10.705	44	34.25	235	59.254	42	23.26	101
27.0	45.184	87	44.85	97	6.843	82	45.29	110	10.749	106	31.90	219	59.296	84	22.25	77
Oct. 7.0	45.271	127	43.88	123	6.925	123	44.19	134	10.855	172	29.71	195	59.380	129	21.48	51
16.9	45.398	168	42.65	146	7.048	163	42.85	158	11.027	237	27.76	158	59.509	175	20.97	16
26.9	45.566	208	41.19	169	7.211	205	41.27	179	11.264	298	26.18	115	59.684	221	20.81	20
Nov. 5.9	45.774	247	39.50	188	7.416	244	39.48	196	11.562	355	25.03	66	59.905	261	21.01	59
15.9	46.021	279	37.62	204	7.660	277	37.52	211	11.917	401	24.37	13	60.166	297	21.60	97
25.8	46.300	306	35.58	214	7.937	304	35.41	217	12.318	434	24.24	43	60.463	323	22.57	134
Dec. 5.8	46.606	323	33.44	217	8.241	322	33.24	220	12.752	456	24.67	98	60.786	342	23.91	169
15.8	46.929	330	31.27	213	8.563	330	31.04	213	13.208	461	25.65	151	61.128	349	25.60	196
25.7	47.259	327	29.14	204	8.893	328	28.91	201	13.669	451	27.16	198	61.477	344	27.56	219
35.7	47.586		27.10		9.221		26.90		14.120		29.14		61.821		29.75	
Mean Place	43.329		57.57		5.021		57.92		9.180		17.34		57.370		9.67	
Sec δ, Tan δ	1.008		+0.124		1.013		+0.162		1.565		−1.203		1.080		−0.408	
$D_\psi \alpha$, $D_\omega \alpha$	+0.06		+0.01		+0.06		+0.01		+0.06		−0.08		+0.06		−0.03	
$D_\psi \delta$, $D_\omega \delta$	−0.4		0.0		−0.4		0.0		−0.4		0.0		−0.4		0.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	4 H. Draconis. Mag. 5.1				δ Crucis. Mag. 3.1				δ Ursae Majoris. Mag. 3.4				γ Corvi. Mag. 2.8			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 12 8		° ′ +78 3		h m 12 10		° ′ −58 17		h m 12 11		° ′ +57 28		h m 12 11		° ′ −17 5
	s		″		s		″		s		″		s		″	
Jan. 0.7	26.05	115	31.96	18	52.140	521	45.51	210	26.514	509	33.04	79	39.535	335	33.79	225
10.7	27.20	110	31.78	49	52.661	485	47.61	253	27.023	486	32.25	18	39.870	313	36.04	231
20.7	28.30	101	32.27	110	53.146	439	50.14	288	27.509	447	32.07	41	40.183	286	38.35	229
30.6	29.31	89	33.37	169	53.585	382	53.02	316	27.956	395	32.48	100	40.469	249	40.64	222
Feb. 9.6	30.20	74	35.06	219	53.967	316	56.18	334	28.351	329	33.48	151	40.718	211	42.86	208
19.6	30.94	55	37.25	261	54.283	250	59.52	344	28.680	257	34.99	196	40.929	168	44.94	192
Mar. 1.6	31.49	36	39.86	289	54.533	180	62.96	346	28.937	178	36.95	230	41.097	126	46.86	171
11.5	31.85	16	42.75	308	54.713	115	66.42	340	29.115	100	39.25	256	41.223	85	48.57	149
21.5	32.01	4	45.83	311	54.828	50	69.82	327	29.215	25	41.81	269	41.308	48	50.06	125
31.5	31.97	25	48.94	304	54.878	9	73.09	307	29.240	48	44.50	271	41.356	13	51.31	102
Apr. 10.5	31.72	40	51.98	285	54.869	64	76.16	283	29.192	110	47.21	262	41.369	16	52.33	77
20.4	31.32	56	54.83	256	54.805	113	78.99	252	29.082	165	49.83	245	41.353	40	53.10	56
30.4	30.76	70	57.39	217	54.692	156	81.51	217	28.917	209	52.28	218	41.313	61	53.66	34
May 10.4	30.06	80	59.56	173	54.536	193	83.68	178	28.708	246	54.46	184	41.252	79	54.00	12
20.3	29.26	87	61.29	123	54.343	226	85.46	136	28.462	270	56.30	144	41.173	91	54.12	8
30.3	28.39	92	62.52	69	54.117	252	86.82	91	28.192	286	57.74	101	41.082	101	54.04	27
June 9.3	27.47	93	63.21	14	53.865	269	87.73	45	27.906	293	58.75	55	40.981	108	53.77	44
19.3	26.54	93	63.35	42	53.596	281	88.18	3	27.613	293	59.30	7	40.873	112	53.33	61
29.2	25.61	90	62.93	95	53.315	284	88.15	50	27.320	284	59.37	41	40.761	113	52.72	77
July 9.2	24.71	85	61.98	149	53.031	280	87.65	96	27.036	269	58.96	88	40.648	110	51.95	89
19.2	23.86	76	60.49	196	52.751	265	86.69	138	26.767	246	58.08	132	40.538	104	51.06	99
29.2	23.10	69	58.53	239	52.486	241	85.31	178	26.521	218	56.76	175	40.434	93	50.07	105
Aug. 8.1	22.41	58	56.14	279	52.245	206	83.53	212	26.303	184	55.01	214	40.341	77	49.02	109
18.1	21.83	46	53.35	313	52.039	161	81.41	238	26.119	142	52.87	249	40.264	58	47.93	107
28.1	21.37	32	50.22	339	51.878	105	79.03	257	25.977	97	50.38	279	40.206	31	46.86	101
Sept. 7.0	21.05	20	46.83	361	51.773	42	76.46	264	25.880	43	47.59	305	40.175	1	45.85	89
17.0	20.85	4	43.22	373	51.731	29	73.82	264	25.837	13	44.54	324	40.174	36	44.96	71
27.0	20.81	13	39.49	379	51.760	108	71.18	251	25.850	75	41.30	339	40.210	76	44.25	50
Oct. 7.0	20.94	28	35.70	376	51.868	187	68.67	229	25.925	142	37.91	346	40.286	120	43.75	21
16.9	21.22	44	31.94	366	52.055	267	66.38	197	26.067	209	34.45	346	40.406	165	43.54	11
26.9	21.66	61	28.28	345	52.322	343	64.41	153	26.276	276	30.99	338	40.571	209	43.65	41
Nov. 5.9	22.27	75	24.83	317	52.665	408	62.88	105	26.552	340	27.61	321	40.780	249	44.06	82
15.9	23.02	88	21.66	280	53.073	465	61.83	49	26.892	399	24.40	295	41.029	285	44.88	115
25.8	23.90	100	18.86	233	53.538	508	61.34	8	27.291	447	21.45	260	41.314	314	46.03	147
Dec. 5.8	24.90	110	16.53	180	54.046	532	61.42	67	27.738	485	18.85	219	41.628	333	47.50	177
15.8	26.00	114	14.73	120	54.578	540	62.09	125	28.223	507	16.66	168	41.961	340	49.27	199
25.7	27.14	116	13.53	56	55.118	531	63.34	177	28.730	512	14.98	113	42.301	337	51.26	217
35.7	28.30		12.97		55.649		65.11		29.242		13.85		42.638		53.43	
Mean Place	25.338		58.69		50.417		55.45		25.585		57.47		38.269		31.84	
Sec δ, Tan δ	4.834		+4.729		1.903		−1.619		1.860		+1.568		1.046		−0.307	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		+0.32		+0.06		−0.11		+0.06		+0.10		+0.06		−0.02	
$D_\psi\delta$, $D_\omega\delta$	−0.4		0.0		−0.4		0.0		−0.4		0.0		−0.4		−0.1	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	20 Comæ. Mag. 5.7 Right Ascension.		Declination.		δ Corvi. Mag. 3.1 Right Ascension.		Declination.		γ Crucis. Mag. 1.6 Right Ascension.		Declination.		8 Canum Venat. Mag. 4.3 Right Ascension.		Declination.
	h m 12 25		° ′ +21 20		h m 12 25		° ′ −16 3		h m 12 26		° ′ −56 39		h m 12 29		° +41 4
	s		″		s		″		s		″		s		″
Jan. 0.7	40.252		25.20		41.450		54.66		41.199		24.64		54.890		29.72
10.7	40.593	341	23.43	177	41.786	336	56.85	219	41.713	514	26.57	193	55.285	395	28.34
20.7	40.920	327	21.99	144	42.106	320	59.09	224	42.197	484	28.93	236	55.668	383	27.48
30.7	41.221	301	20.94	105	42.398	292	61.32	223	42.640	443	31.66	273	56.023	[illegible]	27.16
Feb. 9.6	41.489	268	20.29	65	42.657	259	63.46	214	43.031	391	34.68	302	56.341	318	27.37
19.6	41.718	229	20.06	23	42.879	222	65.48	202	43.363	332	37.88	320	56.613	272	28.10
Mar. 1.6	41.906	188	20.22	16	43.060	181	67.33	185	43.634	271	41.20	332	56.833	220	29.29
11.6	42.047	141	20.73	51	43.201	141	68.96	163	43.841	207	44.56	336	56.999	166	30.87
21.5	42.145	98	21.55	82	43.301	100	70.38	142	43.983	142	47.87	331	57.109	110	32.76
31.5	42.201	56	22.61	106	43.364	63	71.56	118	44.066	83	51.09	322	57.165	56	34.88
Apr. 10.5	42.219	18	23.86	125	43.392	28	72.52	96	44.090	24	54.12	303	57.171	6	37.12
20.4	42.204	15	25.22	136	43.391	1	73.25	73	44.061	29	56.93	281	57.133	38	39.39
30.4	42.161	43	26.62	140	43.364	27	73.77	52	43.983	78	59.47	254	57.055	78	41.60
May 10.4	42.093	68	28.02	140	43.315	49	74.08	31	43.861	122	61.68	221	56.944	111	43.66
20.4	42.007	86	29.34	132	43.247	68	74.18	10	43.702	159	63.53	185	56.808	136	45.51
30.3	41.906	101	30.54	120	43.164	83	74.11	7	43.509	193	64.98	145	56.651	157	47.08
June 9.3	41.795	111	31.60	106	43.070	94	73.85	26	43.287	222	66.00	102	56.479	172	48.34
19.3	41.676	119	32.48	88	42.966	104	73.43	42	43.045	242	66.57	57	56.299	180	49.25
29.3	41.554	122	33.15	67	42.856	110	72.86	57	42.785	260	66.69	12	56.114	185	49.78
July 9.2	41.431	123	33.60	45	42.743	113	72.14	72	42.518	267	66.33	36	55.930	184	49.92
19.2	41.310	121	33.80	20	42.630	113	71.32	82	42.251	267	65.54	79	55.751	179	49.66
29.2	41.197	113	33.77	3	42.522	108	70.41	91	41.994	257	64.31	123	55.583	168	49.02
Aug. 8.1	41.093	104	33.48	29	42.421	101	69.43	98	41.754	240	62.69	162	55.428	155	48.00
18.1	41.004	89	32.94	54	42.334	87	68.43	100	41.543	211	60.74	195	55.294	134	46.62
28.1	40.934	70	32.14	80	42.266	68	67.44	99	41.372	171	58.50	224	55.185	109	44.88
Sept. 7.1	40.887	47	31.08	106	42.222	44	66.51	93	41.250	122	56.07	243	55.105	80	42.83
17.0	40.870	17	29.77	131	42.209	13	65.69	82	41.186	64	53.52	255	55.060	45	40.50
27.0	40.887	17	28.21	156	42.231	22	65.05	64	41.190	4	50.96	256	55.058	2	37.90
Oct. 7.0	40.942	55	26.42	179	42.292	61	64.60	45	41.268	78	48.47	249	55.101	43	35.10
17.0	41.039	97	24.40	202	42.398	106	64.44	16	41.424	156	46.19	228	55.194	93	32.14
26.9	41.179	140	22.20	220	42.548	150	64.57	13	41.657	233	44.22	197	55.340	146	29.06
Nov. 5.9	41.365	186	19.85	235	42.744	196	65.02	45	41.965	308	42.63	159	55.538	198	25.95
15.9	41.594	229	17.39	246	42.983	239	65.82	80	42.342	377	41.50	113	55.788	250	22.89
25.8	41.862	268	14.89	250	43.258	275	66.96	114	42.775	433	40.90	60	56.085	297	19.93
Dec. 5.8	42.163	301	12.42	247	43.564	306	68.39	143	43.255	480	40.86	4	56.423	338	17.17
15.8	42.487	324	10.04	238	43.891	327	70.12	173	43.765	510	41.39	53	56.791	368	14.71
25.8	42.826	339	7.85	219	44.229	338	72.07	195	44.287	522	42.48	109	57.180	389	12.61
35.7	43.168	342	5.90	195	44.568	339	74.18	211	44.805	518	44.09	161	57.577	397	10.95
Mean Place	39.253		40.27		40.268		52.62		39.638		34.58		54.050		50.62
Sec δ, Tan δ	1.074		+0.391		1.041		−0.288		1.820		−1.520		1.341		+0.894
$D_\psi a$, $D_\omega a$	+0.06		+0.03		+0.06		−0.02		+0.07		−0.10		+0.06		+0.06
$D_\psi \delta$, $D_\omega \delta$	−0.4		−0.1		−0.4		−0.1		−0.4		−0.1		−0.4		−0.1

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Draconis. Mag. 3.9 Right Ascension.		κ Draconis. Declination.		β Corvi. Mag. 2.8 Right Ascension.		β Corvi. Declination.		24 Comae seq. Mag. 5.2 Right Ascension.		24 Comae seq. Declination.		α Muscae. Mag. 2.9 Right Ascension.		α Muscae. Declination.	
	h m 12 30		° ′ +70 13		h m 12 30		° ′ −22 56		h m 12 31		° ′ +18 48		h m 12 32		° ′ −68 41	
	s		″		s		″		s		″		s		″	
Jan. 0.7	2.46	74	38.59	68	8.894	347	55.86	218	5.027	338	67.66	186	22.00	73	9.64	163
10.7	3.20	71	37.91	1	9.241	331	58.04	230	5.365	324	65.80	152	22.73	69	11.27	216
20.7	3.91	68	37.90	—61	9.572	305	60.34	235	5.689	300	64.28	116	23.42	63	13.43	261
30.6	4.59	61	38.51	124	9.877	271	62.69	235	5.989	269	63.12	77	24.05	56	16.04	298
Feb. 9.6	5.20	52	39.75	178	10.148	233	65.04	227	6.258	232	62.35	37	24.61	48	19.02	326
19.6	5.72	42	41.53	226	10.381	191	67.31	215	6.490	189	61.98	0	25.09	40	22.28	347
Mar. 1.6	6.14	30	43.79	263	10.572	149	69.46	199	6.679	145	61.98	36	25.49	29	25.75	357
11.6	6.44	17	46.42	288	10.721	108	71.45	181	6.824	103	62.34	68	25.78	21	29.32	361
21.5	6.61	6	49.30	302	10.829	70	73.26	158	6.927	62	63.02	92	25.99	11	32.93	356
31.5	6.67	—6	52.32	303	10.899	34	74.84	136	6.989	25	63.94	113	26.10	4	36.49	343
Apr. 10.5	6.61	18	55.35	293	10.933	4	76.20	112	7.014	—8	65.07	124	26.14	—6	39.92	326
20.4	6.43	27	58.28	272	10.937	—24	77.32	90	7.006	36	66.31	131	26.08	14	43.18	299
30.4	6.16	35	61.00	241	10.913	48	78.22	65	6.970	59	67.62	132	25.94	20	46.17	267
May 10.4	5.81	42	63.41	203	10.865	68	78.87	42	6.911	80	68.94	128	25.74	27	48.84	233
20.4	5.39	47	65.44	159	10.797	84	79.29	18	6.831	94	70.22	117	25.47	32	51.17	189
30.3	4.92	51	67.03	110	10.713	99	79.47	—3	6.737	106	71.39	105	25.15	38	53.06	144
June 9.3	4.41	53	68.13	58	10.614	109	79.44	27	6.631	113	72.44	90	24.77	41	54.50	96
19.3	3.88	54	68.71	5	10.505	118	79.17	47	6.518	120	73.34	70	24.36	43	55.46	44
29.3	3.34	53	68.76	—49	10.387	121	78.70	68	6.398	120	74.04	51	23.93	46	55.90	—7
July 9.2	2.81	50	68.27	101	10.266	122	78.02	86	6.278	117	74.55	29	23.47	45	55.83	59
19.2	2.31	48	67.26	150	10.144	118	77.16	101	6.161	115	74.84	7	23.02	44	55.24	109
29.2	1.83	44	65.76	196	10.026	111	76.15	114	6.046	105	74.91	—18	22.58	42	54.15	156
Aug. 8.1	1.39	38	63.80	239	9.915	97	75.01	122	5.941	91	74.73	40	22.16	36	52.59	197
18.1	1.01	32	61.41	276	9.818	77	73.79	126	5.850	72	74.33	67	21.80	31	50.62	233
28.1	0.69	23	58.65	310	9.741	53	72.53	125	5.778	51	73.66	90	21.49	23	48.29	262
Sept. 7.1	0.46	17	55.55	335	9.688	20	71.28	117	5.727	21	72.76	117	21.26	12	45.67	280
17.0	0.29	7	52.20	356	9.668	—17	70.11	104	5.706	—12	71.59	140	21.14	4	42.87	288
27.0	0.22	—2	48.64	369	9.685	60	69.07	85	5.718	48	70.19	165	21.10	—8	39.99	286
Oct. 7.0	0.24	12	44.95	374	9.745	105	68.22	59	5.766	91	68.54	187	21.18	19	37.13	272
17.0	0.36	24	41.21	372	9.850	152	67.63	28	5.857	135	66.67	209	21.37	31	34.41	245
26.9	0.60	33	37.49	358	10.002	200	67.35	—6	5.992	180	64.58	224	21.68	43	31.96	210
Nov. 5.9	0.93	44	33.91	339	10.202	245	67.41	42	6.172	223	62.34	237	22.11	54	29.86	163
15.9	1.37	53	30.52	308	10.447	283	67.83	81	6.395	262	59.97	243	22.65	59	28.23	112
25.8	1.90	61	27.44	270	10.730	316	68.64	117	6.657	295	57.54	244	23.24	67	27.11	54
Dec. 5.8	2.51	69	24.74	221	11.046	338	69.81	152	6.952	319	55.10	237	23.91	72	26.57	—8
15.8	3.20	72	22.53	167	11.384	350	71.33	180	7.271	334	52.73	223	24.63	73	26.65	69
25.8	3.92	74	20.86	105	11.734	349	73.13	205	7.605	339	50.50	199	25.36	74	27.34	127
35.7	4.66		19.81		12.083		75.18		7.944		48.51		26.10		28.61	
Mean Place	2.077		64.53		7.697		56.27		4.052		81.81		20.162		21.93	
Sec δ, Tan δ	2.956		+2.782		1.086		−0.424		1.057		+0.341		2.752		−2.564	
$D_{\psi}a$, $D_{\omega}a$	+0.05		+0.18		+0.06		−0.03		+0.06		+0.02		+0.07		−0.17	
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.4		−0.1		−0.4		−0.1		−0.4		−0.1		−0.4		−0.1	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Ursæ Majoris. (Alioth.) Mag. 1.7				δ Virginis. Mag. 3.7				α Can. Ven. seq. Mag. 2.9				δ Muscæ. Mag. 3.6			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 12 50		° ′ +56 23		h m 12 51		° ′ + 3 49		h m 12 52		° ′ +38 44		h m 12 56		° ′ −71 6	
	s		″		s		″		s		″		s		″	
Jan. 0.8	28.645		33.70		32.277		65.99		15.139		60.36		42.04		31.05	
10.7	29.140	495	32.43	127	32.605	328	63.94	205	15.523	384	58.72	164	42.86	82	32.29	12
20.7	29.627	487	31.77	66	32.923	318	62.04	190	15.899	376	57.57	115	43.66	80	34.08	17
30.7	30.088	461	31.72	5	33.220	297	60.37	167	16.253	354	56.94	63	44.40	74	36.36	22
Feb. 9.6	30.510	422	32.30	58	33.490	270	58.94	143	16.577	324	56.86	8	45.09	69	39.06	27
19.6	30.879	369	33.44	114	33.727	237	57.82	112	16.860	283	57.30	44	45.69	60	42.09	30
Mar. 1.6	31.185	306	35.10	166	33.926	199	57.01	81	17.097	237	58.22	92	46.19	50	45.36	32
11.6	31.421	236	37.20	210	34.086	160	56.50	51	17.283	186	59.57	135	46.59	40	48.80	34
21.5	31.586	165	39.62	242	34.207	121	56.29	21	17.419	136	61.27	170	46.91	32	52.36	35
31.5	31.677	91	42.29	267	34.291	84	56.33	4	17.504	85	63.24	197	47.12	21	55.98	35
Apr. 10.5	31.698	21	45.06	277	34.343	52	56.61	28	17.541	37	65.39	215	47.22	10	59.41	34
20.5	31.654	44	47.85	279	34.362	19	57.06	45	17.535	6	67.61	222	47.24	2	62.78	33
30.4	31.552	102	50.53	268	34.354	8	57.66	60	17.491	44	69.83	222	47.16	8	65.93	31
May 10.4	31.398	154	53.01	248	34.323	31	58.38	72	17.412	79	71.94	211	47.00	16	68.82	28
20.4	31.201	197	55.22	221	34.271	52	59.16	78	17.304	108	73.90	196	46.75	25	71.33	25
30.3	30.971	230	57.09	187	34.202	69	59.96	80	17.175	129	75.61	171	46.44	31	73.57	22
June 9.3	30.713	258	58.55	146	34.119	83	60.77	81	17.027	148	77.06	145	46.06	38	75.32	17
19.3	30.437	276	59.57	102	34.025	94	61.55	78	16.864	163	78.17	111	45.62	44	76.62	13
29.3	30.150	287	60.12	55	33.922	103	62.29	74	16.694	170	78.94	77	45.13	49	77.41	7
July 9.2	29.860	290	60.19	7	33.813	109	62.96	67	16.519	175	79.33	39	44.62	51	77.60	2
19.2	29.575	285	59.79	40	33.701	112	63.55	59	16.345	174	79.35	2	44.10	52	77.44	2
29.2	29.299	276	58.90	89	33.589	112	64.04	49	16.175	170	78.98	37	43.59	51	76.67	7
Aug. 8.2	29.043	256	57.56	134	33.482	107	64.42	38	16.015	160	78.22	76	43.10	49	75.41	12
18.1	28.811	232	55.79	177	33.385	97	64.65	23	15.869	146	77.10	112	42.64	46	73.68	17
28.1	28.611	200	53.62	217	33.301	84	64.73	8	15.744	125	75.62	148	42.24	40	71.55	21
Sept. 7.1	28.450	161	51.08	254	33.239	62	64.64	9	15.644	100	73.81	181	41.92	32	69.08	24
17.0	28.335	115	48.24	284	33.202	37	64.34	30	15.577	67	71.69	212	41.70	22	66.37	27
27.0	28.274	61	45.11	313	33.195	7	63.83	51	15.548	29	69.29	240	41.59	11	63.50	28
Oct. 7.0	28.272	2	41.79	332	33.226	31	63.08	75	15.563	15	66.63	266	41.61	2	60.58	29
17.0	28.334	62	38.31	348	33.298	72	62.07	101	15.625	62	63.79	284	41.76	15	57.74	28
26.9	28.466	132	34.77	354	33.413	115	60.83	124	15.739	114	60.79	300	42.03	27	55.09	26
Nov. 5.9	28.666	200	31.24	353	33.573	160	59.35	148	15.906	167	57.71	308	42.44	41	52.72	23
15.9	28.936	270	27.80	344	33.777	204	57.62	173	16.125	219	54.62	309	42.97	53	50.77	19
25.9	29.270	334	24.54	326	34.021	244	55.72	190	16.393	268	51.60	302	43.60	63	49.29	14
Dec. 5.8	29.663	393	21.58	296	34.298	277	53.67	205	16.704	311	48.73	287	44.32	72	48.38	9
15.8	30.102	439	18.98	260	34.602	304	51.52	215	17.049	345	46.10	263	45.10	78	48.04	3
25.8	30.574	472	16.84	214	34.922	320	49.36	216	17.418	369	43.78	232	45.91	81	48.31	2
35.7	31.066	492	15.21	163	35.249	327	47.25	211	17.799	381	41.87	191	46.74	83	49.19	8
Mean Place	28.231		57.31		31.350		74.59		14.477		80.03		40.410		44.10	
Sec δ, Tan δ	1.806		+1.505		1.002		+0.067		1.282		+0.803		3.090		−2.923	
$D_\psi a$, $D_\omega a$	+0.05		+0.10		+0.06		0.00		+0.06		+0.05		+0.08		−0.19	
$D_\psi \delta$, $D_\omega \delta$	−0.4		−0.2		−0.4		−0.2		−0.4		−0.2		−0.4		−0.2	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Hydræ. Mag. 3.3 Right Ascension.		γ Hydræ. Declination.		ι Centauri. Mag. 2.9 Right Ascension.		ι Centauri. Declination.		ζ¹ Ursæ Majoris. (*Mizar.*) Mag. 2.4 Right Ascension.		ζ¹ Ursæ Majoris. Declination.		α Virginis. (*Spica.*) Mag. 1.2 Right Ascension.		α Virginis. Declination.	
	h m 13 14		° ′ −22 44		h m 13 16		° ′ −36 17		h m 13 20		° ′ +55 20		h m 13 20		° ′ −10 44	
	s		″		s		″		s		″		s		″	
Jan. 0.8	31.794		39.14		3.200		2.02		40.146		30.52		56.245		22.70	
10.7	32.149	355	41.03	189	3.593	393	3.71	169	40.622	476	28.89	163	56.581	336	24.68	198
20.7	32.494	345	43.07	204	3.976	383	5.68	197	41.101	479	27.85	104	56.911	330	26.68	200
30.7	32.821	327	45.19	212	4.340	364	7.89	221	41.565	464	27.44	41	57.224	313	28.62	194
Feb. 9.7	33.122	301	47.32	213	4.674	334	10.23	234	41.999	434	27.66	22	57.515	291	30.45	183
19.6	33.391	269	49.39	207	4.973	299	12.66	243	42.389	390	28.49	83	57.775	260	32.11	166
Mar. 1.6	33.626	235	51.38	199	5.232	259	15.11	245	42.726	337	29.88	139	58.001	226	33.59	148
11.6	33.821	195	53.23	185	5.450	218	17.53	242	43.000	274	31.76	187	58.193	192	34.83	124
21.6	33.978	157	54.90	167	5.626	176	19.87	234	43.209	209	34.04	228	58.348	155	35.86	103
31.5	34.098	120	56.40	150	5.760	134	22.08	221	43.348	139	36.62	258	58.467	119	36.65	79
Apr. 10.5	34.183	85	57.71	131	5.856	96	24.12	204	43.420	72	39.39	277	58.554	87	37.23	58
20.5	34.236	53	58.80	109	5.914	58	26.00	188	43.428	8	42.23	284	58.609	55	37.60	37
30.4	34.258	22	59.70	90	5.937	23	27.66	166	43.375	53	45.04	281	58.635	26	37.78	15
May 10.4	34.254	4	60.39	69	5.928	9	29.09	143	43.269	106	47.72	268	58.636	1	37.80	2
20.4	34.224	30	60.89	50	5.890	38	30.27	118	43.115	154	50.17	245	58.612	24	37.68	12
30.4	34.173	51	61.17	28	5.824	66	31.19	92	42.921	194	52.32	215	58.569	43	37.42	26
June 9.3	34.100	73	61.26	9	5.734	90	31.82	63	42.694	227	54.11	179	58.505	64	37.06	36
19.3	34.010	90	61.16	10	5.621	113	32.17	35	42.440	254	55.50	139	58.425	80	36.61	45
29.3	33.905	105	60.87	29	5.490	131	32.23	6	42.168	272	56.43	93	58.331	94	36.07	54
July 9.3	33.787	118	60.40	47	5.344	146	31.98	25	41.885	283	56.87	44	58.225	106	35.47	60
19.2	33.661	126	59.75	65	5.188	156	31.45	53	41.596	289	56.84	3	58.109	116	34.81	66
29.2	33.531	130	58.96	79	5.027	161	30.63	82	41.309	287	56.33	51	57.989	120	34.11	70
Aug. 8.2	33.401	130	58.03	93	4.867	160	29.56	107	41.031	278	55.35	98	57.869	120	33.40	71
18.1	33.278	123	57.01	102	4.714	153	28.27	129	40.772	259	53.90	145	57.755	114	32.71	69
28.1	33.168	110	55.92	109	4.577	137	26.80	147	40.536	236	52.03	187	57.650	105	32.05	66
Sept. 7.1	33.078	90	54.81	111	4.465	112	25.21	159	40.333	203	49.76	227	57.563	87	31.46	59
17.1	33.016	62	53.73	108	4.385	80	23.54	167	40.172	161	47.12	264	57.500	63	30.97	49
27.0	32.988	28	52.73	100	4.346	39	21.89	165	40.059	113	44.17	295	57.469	31	30.63	34
Oct. 7.0	33.000	12	51.88	85	4.353	7	20.31	158	40.001	58	40.96	321	57.474	5	30.49	14
17.0	33.059	59	51.24	64	4.414	61	18.89	142	40.007	6	37.56	340	57.521	47	30.55	6
27.0	33.166	107	50.84	40	4.531	117	17.72	117	40.079	72	34.01	355	57.614	93	30.88	33
Nov. 5.9	33.322	156	50.74	10	4.704	173	16.82	90	40.222	143	30.42	359	57.756	142	31.48	60
15.9	33.530	208	50.98	24	4.933	229	16.30	52	40.436	214	26.88	354	57.942	186	32.36	88
25.9	33.782	252	51.55	57	5.213	280	16.17	13	40.718	282	23.45	343	58.174	232	33.52	116
Dec. 5.8	34.072	290	52.46	91	5.537	324	16.46	29	41.062	344	20.24	321	58.443	269	34.94	142
15.8	34.393	321	53.70	124	5.894	357	17.17	71	41.460	398	17.37	287	58.743	300	36.59	165
25.8	34.734	341	55.23	153	6.272	378	18.28	111	41.900	440	14.91	246	59.063	320	38.40	181
35.8	35.085	351	56.99	176	6.661	389	19.76	148	42.367	467	12.95	196	59.395	332	40.33	193
Mean Place	30.850		40.30		2.190		7.50		40.092		52.99		55.405		19.88	
Sec δ, Tan δ	1.084		−0.419		1.241		−0.734		1.759		+1.447		1.018		−0.190	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		−0.03		+0.07		−0.05		+0.05		+0.09		+0.06		−0.01	
$D_\psi\delta$, $D_\omega\delta$	−0.4		−0.3		−0.4		−0.3		−0.4		−0.3		−0.4		−0.3	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	4 Ursæ Minoris. Mag. 5.0 Right Ascension.		4 Ursæ Minoris. Declination.		ι Virginis. Mag. 4.2 Right Ascension.		ι Virginis. Declination.		α Boötis. (*Arcturus.*) Mag. 0.2 Right Ascension.		α Boötis. Declination.		λ Boötis. Mag. 4.3 Right Ascension.		λ Boötis. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	14 9		+77 55		14 11		− 5 36		14 11		+19 35		14 13		+46 27	
	s		″		s		″		s		″		s		″	
Jan. 0.8	4.98		18.46		46.407		55.74		58.273		61.31		18.144		16.79	
10.8	6.00	102	16.68	178	46.731	324	57.64	190	58.595	322	59.03	228	18.535	391	14.53	226
20.8	7.08	108	15.53	115	47.058	327	59.50	186	58.924	329	57.05	198	18.939	404	12.80	173
30.7	8.19	111	15.05	48	47.379	321	61.27	177	59.249	325	55.43	162	19.343	404	11.63	117
Feb. 9.7	9.27	108	15.24	19	47.685	306	62.87	160	59.559	310	54.23	120	19.734	391	11.08	55
19.7	10.30	103	16.11	87	47.971	286	64.28	141	59.850	291	53.46	77	20.102	368	11.14	6
Mar. 1.6	11.23	93	17.60	149	48.230	259	65.45	117	60.113	263	53.14	32	20.435	333	11.79	65
11.6	12.04	81	19.64	204	48.460	230	66.37	92	60.345	232	53.27	13	20.726	291	13.00	121
21.6	12.69	65	22.13	249	48.657	197	67.03	66	60.542	197	53.78	51	20.971	245	14.70	170
31.6	13.16	47	24.98	285	48.823	166	67.45	42	60.703	161	54.67	89	21.165	194	16.82	212
Apr. 10.5	13.45	29	28.08	310	48.959	136	67.63	18	60.829	126	55.85	118	21.308	143	19.25	243
20.5	13.56	11	31.29	321	49.062	103	67.62	1	60.922	93	57.26	141	21.399	91	21.89	264
30.5	13.48	8	34.49	320	49.137	75	67.42	20	60.981	59	58.83	157	21.440	41	24.64	275
May 10.5	13.22	26	37.58	309	49.184	47	67.08	34	61.008	27	60.50	167	21.434	6	27.39	275
20.4	12.81	41	40.46	288	49.204	20	66.64	44	61.007	1	62.17	167	21.386	48	30.05	266
30.4	12.24	57	43.03	257	49.199	5	66.10	54	60.977	30	63.80	163	21.295	91	32.53	248
June 9.4	11.55	69	45.21	218	49.168	31	65.51	59	60.923	54	65.34	154	21.169	126	34.76	223
19.3	10.73	82	46.96	175	49.116	52	64.89	62	60.845	78	66.74	140	21.010	159	36.69	193
29.3	9.85	88	48.21	125	49.041	75	64.24	65	60.747	98	67.95	121	20.824	186	38.24	155
July 9.3	8.90	95	48.94	73	48.948	93	63.60	64	60.629	118	68.95	100	20.615	209	39.39	115
19.3	7.91	99	49.14	20	48.839	109	62.96	64	60.496	133	69.70	75	20.390	225	40.11	72
29.2	6.91	100	48.79	35	48.716	123	62.35	61	60.352	144	70.21	51	20.152	238	40.38	27
Aug. 8.2	5.91	100	47.91	88	48.585	131	61.79	56	60.201	151	70.43	22	19.909	243	40.20	18
18.2	4.94	97	46.52	139	48.451	134	61.28	51	60.048	153	70.37	6	19.668	241	39.56	64
28.2	4.02	92	44.64	188	48.320	131	60.85	43	59.899	149	70.01	36	19.435	233	38.47	109
Sept. 7.1	3.17	85	42.31	233	48.201	119	60.52	33	59.761	138	69.36	65	19.220	215	36.95	152
17.1	2.43	74	39.57	274	48.098	103	60.33	19	59.642	119	68.42	94	19.030	190	35.02	193
27.1	1.80	63	36.47	310	48.021	77	60.28	5	59.548	94	67.16	126	18.874	156	32.73	229
Oct. 7.0	1.29	51	33.09	338	47.977	44	60.40	12	59.487	61	65.63	153	18.760	114	30.08	265
17.0	0.94	35	29.48	361	47.972	5	60.74	34	59.465	22	63.82	181	18.696	64	27.13	295
27.0	0.77	17	25.73	375	48.011	39	61.30	56	59.488	23	61.76	206	18.689	7	23.96	317
Nov. 6.0	0.76	1	21.92	381	48.099	88	62.11	81	59.559	71	59.47	229	18.743	54	20.61	335
15.9	0.94	18	18.13	379	48.236	137	63.15	104	59.681	122	56.99	248	18.859	116	17.16	345
25.9	1.29	35	14.47	366	48.420	184	64.44	129	59.852	171	54.37	262	19.039	180	13.70	346
Dec. 5.9	1.83	54	11.05	342	48.647	227	65.94	150	60.068	216	51.69	268	19.280	241	10.32	338
15.9	2.54	71	7.96	309	48.912	265	67.63	169	60.324	256	49.01	268	19.574	294	7.12	320
25.8	3.39	85	5.31	265	49.205	293	69.43	180	60.612	288	46.43	258	19.913	339	4.22	290
35.8	4.36	97	3.17	214	49.519	314	71.31	188	60.924	312	44.01	242	20.286	373	1.69	253
Mean Place	8.497		41.04		45.878		52.32		57.972		72.75		18.371		35.07	
Sec δ, Tan δ	4.780		+4.074		1.005		−0.098		1.061		+0.356		1.452		+1.052	
$D_\psi\alpha$, $D_\omega\alpha$	−0.01		+0.26		+0.06		−0.01		+0.06		+0.02		+0.05		+0.06	
$D_\psi\delta$, $D_\omega\delta$	−0.3		−0.5		−0.3		−0.5		−0.3		−0.5		−0.3		−0.5	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Virginis. Mag. 4.6				2 Libræ. Mag. 6.3				θ Boötis. Mag. 4.1				*f* Boötis. Mag. 5.4			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 14 14		° ′ −12 59		h m 14 19		° ′ −11 20		h m 14 22		° ′ +52 12		h m 14 22		° ′ +19 34	
	s		″		s		″		s		″		s		″	
Jan. 0.8	43.953		56.99		4.453		42.37		25.894		69.93		41.519		74.58	
10.8	44.284	331	58.71	172	4.780	327	44.11	174	26.310	416	67.61	232	41.839	320	72.31	227
20.8	44.618	334	60.48	177	5.112	332	45.88	177	26.746	436	65.85	176	42.168	329	70.35	196
30.7	44.947	329	62.23	175	5.439	327	47.62	174	27.186	440	64.67	118	42.495	327	68.75	160
Feb. 9.7	45.262	315	63.90	167	5.753	314	49.26	164	27.616	430	64.15	52	42.811	316	67.55	120
19.7	45.554	292	65.46	156	6.046	293	50.77	151	28.023	407	64.25	10	43.107	296	66.80	75
Mar. 1.7	45.820	266	66.85	139	6.313	267	52.10	133	28.397	374	64.98	73	43.379	272	66.50	30
11.6	46.058	238	68.05	120	6.552	239	53.22	112	28.725	328	66.29	131	43.619	240	66.64	14
21.6	46.263	205	69.06	101	6.760	208	54.14	92	29.002	277	68.11	182	43.827	208	67.20	56
31.6	46.436	173	69.85	79	6.936	176	54.83	69	29.224	222	70.36	225	44.000	173	68.11	91
Apr. 10.5	46.579	143	70.44	59	7.082	146	55.32	49	29.388	164	72.94	258	44.139	139	69.35	124
20.5	46.690	111	70.85	41	7.196	114	55.61	29	29.494	106	75.73	279	44.244	105	70.82	147
30.5	46.771	81	71.07	22	7.281	85	55.74	13	29.542	48	78.63	290	44.315	71	72.47	165
May 10.5	46.825	54	71.15	8	7.338	57	55.72	2	29.535	7	81.54	291	44.356	41	74.22	175
20.4	46.851	26	71.10	5	7.367	29	55.57	15	29.477	58	84.36	282	44.366	10	75.99	177
30.4	46.851	0	70.93	17	7.370	3	55.30	27	29.371	106	86.99	263	44.347	19	77.74	175
June 9.4	46.824	27	70.66	27	7.347	23	54.96	34	29.221	150	89.35	236	44.303	44	79.38	164
19.4	46.774	50	70.31	35	7.301	46	54.54	42	29.035	186	91.38	203	44.233	70	80.88	150
29.3	46.701	73	69.88	43	7.230	71	54.06	48	28.815	220	93.02	164	44.142	91	82.22	134
July 9.3	46.609	92	69.39	49	7.139	91	53.54	52	28.567	248	94.23	121	44.029	113	83.34	112
19.3	46.498	111	68.85	54	7.031	108	52.98	56	28.300	267	94.99	76	43.900	129	84.22	88
29.2	46.372	126	68.26	59	6.907	124	52.39	59	28.019	281	95.27	28	43.758	142	84.82	60
Aug. 8.2	46.238	134	67.64	62	6.774	133	51.79	60	27.730	289	95.07	20	43.607	151	85.16	34
18.2	46.101	137	67.01	63	6.636	138	51.19	60	27.442	288	94.38	69	43.452	155	85.21	5
28.2	45.966	135	66.38	63	6.500	136	50.62	57	27.162	280	93.22	116	43.300	152	84.96	25
Sept. 7.1	45.843	123	65.79	59	6.374	126	50.09	53	26.902	260	91.61	161	43.157	143	84.42	54
17.1	45.736	107	65.27	52	6.265	109	49.64	45	26.668	234	89.56	205	43.031	126	83.58	84
27.1	45.656	80	64.84	43	6.182	83	49.30	34	26.471	197	87.13	243	42.929	102	82.43	115
Oct. 7.1	45.608	48	64.56	28	6.131	51	49.11	19	26.320	151	84.34	279	42.859	70	80.99	144
17.0	45.602	6	64.44	12	6.120	11	49.09	2	26.224	96	81.24	310	42.828	31	79.27	172
27.0	45.641	39	64.53	9	6.155	35	49.28	19	26.189	35	77.91	333	42.842	14	77.29	198
Nov. 6.0	45.730	89	64.86	33	6.239	84	49.71	43	26.220	31	74.39	352	42.903	61	75.07	222
15.9	45.871	141	65.44	58	6.372	133	50.38	67	26.322	102	70.79	360	43.015	112	72.67	240
25.9	46.058	187	66.28	84	6.554	182	51.30	92	26.494	172	67.18	361	43.177	162	70.11	256
Dec. 5.9	46.290	232	67.38	110	6.781	227	52.47	117	26.734	240	63.68	350	43.385	208	67.48	263
15.9	46.561	271	68.69	131	7.047	266	53.84	137	27.036	302	60.37	331	43.635	250	64.85	263
25.8	46.862	301	70.20	151	7.343	296	55.40	156	27.391	355	57.37	300	43.918	283	62.30	255
35.8	47.182	320	71.86	166	7.660	317	57.09	169	27.786	395	54.76	261	44.227	309	59.91	239
Mean Place	43.394		56.03		3.926		40.97		26.416		88.79		41.283		85.57	
Sec δ, Tan δ	1.026		−0.231		1.020		−0.201		1.632		+1.290		1.061		+0.356	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		−0.01		+0.07		−0.01		+0.04		+0.07		+0.06		+0.02	
$D_\psi\delta$, $D_\omega\delta$	−0.3		−0.6		−0.3		−0.6		−0.3		−0.6		−0.3		−0.6	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	*φ* Virginis. Mag. 5.0 Right Ascension.		Declination.		δ Ursæ Minoris. Mag. 4.4 Right Ascension.		Declination.	
	h m		° ′		h m		° ′	
	14 24		− 1 51		14 27		+76 2	
	s		″		s		″	
Jan. 0.8	2.076		59.89		37.27		60.86	
10.8	2.394	318	61.83	194	38.13	86	58.82	204
20.8	2.717	323	63.69	186	39.06	93	57.40	142
30.7	3.036	319	65.40	171	40.03	97	56.63	77
Feb. 9.7	3.343	307	66.94	154	40.99	96	56.54	9
19.7	3.632	289	68.21	127	41.91	92	57.13	59
Mar. 1.7	3.896	264	69.24	103	42.76	85	58.36	123
11.6	4.133	237	69.97	73	43.52	76	60.17	181
21.6	4.338	205	70.41	44	44.14	62	62.49	232
31.6	4.513	175	70.61	20	44.63	49	65.21	272
Apr. 10.6	4.658	145	70.55	6	44.96	33	68.23	302
20.5	4.771	113	70.26	29	45.13	17	71.41	318
30.5	4.856	85	69.81	45	45.14	1	74.65	324
May 10.5	4.912	56	69.22	59	45.00	14	77.83	318
20.4	4.940	28	68.52	70	44.71	29	80.83	300
30.4	4.943	3	67.76	76	44.28	43	83.58	275
June 9.4	4.920	23	66.97	79	43.74	54	85.98	240
19.4	4.874	46	66.17	80	43.10	64	87.97	199
29.3	4.804	70	65.39	78	42.37	73	89.50	153
July 9.3	4.715	89	64.63	76	41.56	81	90.52	102
19.3	4.608	107	63.94	69	40.72	84	91.02	50
29.3	4.485	123	63.31	63	39.85	87	90.97	5
Aug. 8.2	4.353	132	62.76	55	38.98	87	90.40	57
18.2	4.215	138	62.31	45	38.12	86	89.30	110
28.2	4.079	136	61.97	34	37.30	82	87.70	160
Sept. 7.1	3.951	128	61.77	20	36.52	78	85.63	207
17.1	3.840	111	61.71	6	35.82	70	83.13	250
27.1	3.752	88	61.82	11	35.20	62	80.24	289
Oct. 7.1	3.697	55	62.14	32	34.70	50	77.03	321
17.0	3.677	20	62.66	52	34.33	37	73.54	349
27.0	3.702	25	63.43	77	34.10	23	69.87	367
Nov. 6.0	3.775	73	64.42	99	34.02	8	66.09	378
16.0	3.897	122	65.65	123	34.10	8	62.29	380
25.9	4.067	170	67.10	145	34.35	25	58.56	373
Dec. 5.9	4.281	214	68.75	165	34.76	41	55.02	354
15.9	4.535	254	70.54	179	35.32	56	51.77	325
25.8	4.819	284	72.43	189	36.02	70	48.92	285
35.8	5.125	306	74.36	193	36.84	82	46.53	239
Mean Place	1.637		55.59		40.660		82.13	
Sec δ, Tan δ	1.001		−0.033		4.149		+4.027	
$D_\psi a$, $D_\omega a$	+0.06		0.00		0.00		+0.22	
$D_\psi \delta$, $D_\omega \delta$	−0.3		−0.6		−0.3		−0.6	

Washington Mean Time.	*ρ* Boötis. Mag. 3.8 Right Ascension.		Declination.		γ Boötis. Mag. 3.0 Right Ascension.		Declination.
	h m		° ′		h m		°
	14 28		+30 43		14 28		+38
	s		″		s		″
Jan. 0.8	20.412		21.16		48.895		27.53
10.8	20.744	332	18.79	237	49.246	351	25.14
20.8	21.089	345	16.82	197	49.612	366	23.20
30.7	21.435	346	15.30	152	49.980	368	21.79
Feb. 9.7	21.771	336	14.28	102	50.340	360	20.92
19.7	22.089	318	13.79	49	50.680	340	20.63
Mar. 1.7	22.379	290	13.84	5	50.992	312	20.92
11.6	22.639	260	14.40	56	51.271	279	21.76
21.6	22.862	223	15.43	103	51.510	239	23.09
31.6	23.050	188	16.85	142	51.707	197	24.85
Apr. 10.6	23.197	147	18.62	177	51.861	154	26.96
20.5	23.306	109	20.64	202	51.971	110	29.31
30.5	23.378	72	22.83	219	52.039	68	31.81
May 10.5	23.413	35	25.09	226	52.065	26	34.38
20.4	23.415	2	27.34	225	52.053	12	36.91
30.4	23.384	31	29.52	218	52.005	48	39.32
June 9.4	23.322	62	31.54	202	51.922	83	41.55
19.4	23.233	89	33.36	182	51.809	113	43.51
29.3	23.119	114	34.92	156	51.669	140	45.17
July 9.3	22.983	136	36.19	127	51.505	164	46.48
19.3	22.828	155	37.13	94	51.322	183	47.42
29.3	22.659	169	37.72	59	51.124	198	47.95
Aug. 8.2	22.481	178	37.95	23	50.917	207	48.06
18.2	22.299	182	37.81	14	50.707	210	47.76
28.2	22.120	179	37.30	51	50.501	206	47.04
Sept. 7.1	21.952	168	36.41	89	50.307	194	45.90
17.1	21.800	152	35.16	125	50.133	174	44.36
27.1	21.676	124	33.55	161	49.986	147	42.46
Oct. 7.1	21.583	93	31.63	192	49.876	110	40.20
17.0	21.532	51	29.38	225	49.810	66	37.62
27.0	21.528	4	26.87	251	49.794	16	34.78
Nov. 6.0	21.576	48	24.13	274	49.833	39	31.71
16.0	21.677	101	21.23	290	49.931	98	28.51
25.9	21.832	155	18.22	301	50.086	155	25.24
Dec. 5.9	22.037	205	15.20	302	50.296	210	21.98
15.9	22.289	252	12.23	297	50.556	260	18.83
25.8	22.577	288	9.42	281	50.859	303	15.91
35.8	22.896	319	6.86	256	51.194	335	13.28
Mean Place	20.381		34.97		49.034		43.26
Sec δ, Tan δ	1.163		+0.594		1.281		+0.800
$D_\psi a$, $D_\omega a$	+0.05		+0.03		+0.05		+0.04
$D_\psi \delta$, $D_\omega \delta$	−0.3		−0.6		−0.3		−0.6

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Libræ. Mag. 5.3 Right Ascension.		δ Libræ. Declination.		α Libræ. Mag. 2.9 Right Ascension.		α Libræ. Declination.		Groombridge 2164. Mag. 5.7 Right Ascension.		Groombridge 2164. Declination.		β Ursæ Minoris. Mag. 2.2 Right Ascension.		β Ursæ Minoris. Declination.	
	h m 14 46		° ′ −15 39		h m 14 46		° ′ −15 42		h m 14 49		° ′ +59 36		h m 14 50		° ′ +74 28	
	s		″		s		″		s		″		s		″	
Jan. 0.8	12.599		39.72		24.049		20.86		21.735		63.61		52.20		51.90	
10.8	12.925	326	41.21	149	24.372	323	22.35	149	22.186	451	61.12	249	52.95	75	49.58	232
20.8	13.259	334	42.78	157	24.706	334	23.91	156	22.672	486	59.18	194	53.76	81	47.83	175
30.8	13.592	333	44.37	159	25.039	333	25.49	158	23.176	504	57.85	133	54.63	87	46.73	110
Feb. 9.7	13.917	325	45.92	155	25.363	324	27.04	155	23.680	504	57.17	68	55.50	87	46.30	43
19.7	14.225	308	47.38	146	25.672	309	28.51	147	24.168	488	57.17	0	56.36	86	46.56	26
Mar. 1.7	14.513	288	48.72	134	25.959	287	29.84	133	24.626	458	57.82	65	57.16	80	47.49	93
11.6	14.774	261	49.90	118	26.222	263	31.02	118	25.040	414	59.08	126	57.88	72	49.03	154
21.6	15.009	235	50.91	101	26.455	233	32.03	101	25.400	360	60.93	185	58.51	63	51.11	208
31.6	15.213	204	51.73	82	26.660	205	32.85	82	25.698	298	63.24	231	59.03	52	53.66	255
Apr. 10.6	15.387	174	52.37	64	26.835	175	33.49	64	25.927	229	65.92	268	59.41	38	56.54	288
20.5	15.533	146	52.85	48	26.981	146	33.97	48	26.087	160	68.86	294	59.64	23	59.67	313
30.5	15.648	115	53.17	32	27.096	115	34.30	33	26.175	88	71.97	311	59.75	11	62.91	324
May 10.5	15.735	87	53.34	17	27.183	87	34.48	18	26.194	19	75.11	314	59.71	4	66.16	325
20.5	15.791	56	53.40	6	27.241	58	34.54	6	26.144	50	78.17	306	59.53	18	69.30	314
30.4	15.819	28	53.35	5	27.269	28	34.49	5	26.032	112	81.09	292	59.22	31	72.22	292
June 9.4	15.820	1	53.21	14	27.269	0	34.35	14	25.862	170	83.73	264	58.80	42	74.85	263
19.4	15.791	29	52.97	24	27.241	28	34.11	24	25.638	224	86.07	234	58.28	52	77.12	227
29.3	15.736	55	52.66	31	27.186	55	33.81	30	25.368	270	88.01	194	57.66	62	78.96	184
July 9.3	15.655	81	52.29	37	27.104	82	33.44	37	25.058	310	89.52	151	56.98	68	80.32	136
19.3	15.552	103	51.85	44	27.001	103	33.00	44	24.717	341	90.55	103	56.24	74	81.18	86
29.3	15.428	124	51.36	49	26.877	124	32.51	49	24.353	364	91.09	54	55.46	78	81.51	33
Aug. 8.2	15.291	137	50.81	55	26.740	137	31.97	54	23.974	379	91.12	3	54.66	80	81.31	20
18.2	15.145	146	50.23	58	26.593	147	31.39	58	23.590	384	90.63	49	53.86	80	80.58	73
28.2	14.996	149	49.64	59	26.444	149	30.79	60	23.212	378	89.64	99	53.08	78	79.34	124
Sept. 7.2	14.852	144	49.05	59	26.301	143	30.19	60	22.850	362	88.17	147	52.34	74	77.60	174
17.1	14.723	129	48.48	57	26.171	130	29.62	57	22.515	335	86.23	194	51.64	70	75.40	220
27.1	14.617	106	47.97	51	26.065	106	29.11	51	22.219	296	83.87	236	51.03	61	72.78	262
Oct. 7.1	14.542	75	47.56	41	25.990	75	28.70	41	21.974	245	81.11	276	50.51	52	69.79	299
17.0	14.505	37	47.30	26	25.954	36	28.43	27	21.789	185	78.01	310	50.09	42	66.50	329
27.0	14.514	9	47.19	11	25.962	8	28.32	11	21.674	115	74.64	337	49.80	29	62.95	355
Nov. 6.0	14.572	58	47.29	10	26.021	59	28.43	11	21.637	37	71.06	358	49.65	15	59.24	371
16.0	14.682	110	47.62	33	26.131	110	28.75	32	21.684	47	67.36	370	49.64	1	55.45	379
25.9	14.843	161	48.19	57	26.291	160	29.32	57	21.814	130	63.64	372	49.79	15	51.68	377
Dec. 5.9	15.051	208	49.01	82	26.500	209	30.13	81	22.026	212	59.99	365	50.09	30	48.03	365
15.9	15.302	251	50.05	104	26.751	251	31.18	105	22.320	294	56.53	346	50.52	43	44.62	341
25.9	15.587	285	51.31	126	27.035	284	32.43	125	22.682	362	53.35	318	51.10	58	41.54	308
35.8	15.898	311	52.72	141	27.346	311	33.83	140	23.104	422	50.57	278	51.78	68	38.89	265
Mean Place	12.189		40.19		23.636		21.34		22.965		81.82		55.657		71.37	
Sec δ, Tan δ	1.039		−0.280		1.039		−0.281		1.977		+1.706		3.738		+3.602	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.07		−0.01		+0.07		−0.01		+0.03		+0.08		0.00		+0.18	
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.3		−0.7		−0.3		−0.7		−0.3		−0.7		−0.3		−0.7	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Boötis. Mag. 3.6 Right Ascension.		β Boötis. Declination.		γ Scorpii. Mag. 3.4 Right Ascension.		γ Scorpii. Declination.		ψ Boötis. Mag. 4.7 Right Ascension.		ψ Boötis. Declination.		c Boötis. Mag. 5.0 Right Ascension.		c Boötis. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	14 58		+40 42		14 59		−24 57		15 0		+27 15		15 3		+25 10	
	s		″		s		″		s		″		s		″	
Jan. 0.8	53.289		19.52		19.908		48.43		58.366		34.77		44.509		51.29	
10.8	53.627	338	16.92	260	20.245	337	49.54	111	58.676	310	32.28	249	44.816	307	48.83	246
20.8	53.987	360	14.76	216	20.595	350	50.80	126	59.003	327	30.14	214	45.139	323	46.69	214
30.8	54.357	370	13.11	165	20.946	351	52.18	138	59.336	333	28.40	174	45.469	330	44.93	176
Feb. 9.7	54.726	369	12.02	109	21.291	345	53.63	145	59.666	330	27.13	127	45.797	328	43.62	131
19.7	55.082	356	11.53	49	21.622	331	55.10	147	59.985	319	26.37	76	46.113	316	42.80	82
Mar. 1.7	55.418	336	11.64	11	21.931	309	56.55	145	60.284	299	26.12	25	46.410	297	42.48	32
11.7	55.724	306	12.32	68	22.218	287	57.94	139	60.559	275	26.39	27	46.684	274	42.66	18
21.6	55.995	271	13.55	123	22.476	258	59.24	130	60.804	245	27.14	75	46.929	245	43.32	66
31.6	56.228	233	15.25	170	22.706	230	60.42	118	61.016	212	28.33	119	47.142	213	44.41	109
Apr. 10.6	56.418	190	17.35	210	22.906	200	61.49	107	61.194	178	29.89	156	47.323	181	45.86	145
20.5	56.565	147	19.74	239	23.075	169	62.44	95	61.338	144	31.74	185	47.468	145	47.62	176
30.5	56.669	104	22.34	260	23.214	139	63.27	83	61.446	108	33.81	207	47.580	112	49.58	196
May 10.5	56.729	60	25.04	270	23.320	106	63.97	70	61.518	72	36.00	219	47.658	78	51.69	211
20.5	56.747	18	27.75	271	23.396	76	64.56	59	61.558	40	38.24	224	47.703	45	53.85	216
30.4	56.725	22	30.38	263	23.441	45	65.02	46	61.563	5	40.45	221	47.714	11	55.98	213
June 9.4	56.664	61	32.85	247	23.452	11	65.37	35	61.535	28	42.55	210	47.693	21	58.03	205
19.4	56.568	96	35.09	224	23.432	20	65.58	21	61.477	58	44.50	195	47.643	50	59.93	190
29.4	56.438	130	37.04	195	23.382	50	65.68	10	61.390	87	46.23	173	47.563	80	61.63	170
July 9.3	56.278	160	38.64	160	23.302	80	65.65	3	61.276	114	47.71	148	47.455	108	63.09	146
19.3	56.094	184	39.86	122	23.195	107	65.47	18	61.140	136	48.89	118	47.326	129	64.26	117
29.3	55.887	207	40.68	82	23.066	129	65.17	30	60.982	158	49.76	87	47.176	150	65.14	88
Aug. 8.2	55.666	221	41.07	39	22.919	147	64.74	43	60.809	173	50.28	52	47.009	167	65.69	55
18.2	55.437	229	41.02	5	22.760	159	64.17	57	60.628	181	50.45	17	46.833	176	65.90	21
28.2	55.206	231	40.54	48	22.596	164	63.48	69	60.443	185	50.26	19	46.653	180	65.76	14
Sept. 7.2	54.982	224	39.62	92	22.437	159	62.72	76	60.263	180	49.70	56	46.476	177	65.29	47
17.1	54.774	208	38.27	135	22.291	146	61.90	82	60.096	167	48.80	90	46.313	163	64.45	84
27.1	54.589	185	36.51	176	22.168	123	61.05	85	59.948	148	47.53	127	46.168	145	63.27	118
Oct. 7.1	54.439	150	34.37	214	22.076	92	60.21	84	59.830	118	45.91	162	46.052	116	61.75	152
17.1	54.330	109	31.88	249	22.026	50	59.44	77	59.749	81	43.98	193	45.973	79	59.93	182
27.0	54.271	59	29.09	279	22.022	4	58.80	64	59.713	36	41.75	223	45.936	37	57.80	213
Nov. 6.0	54.268	3	26.04	305	22.073	51	58.31	49	59.725	12	39.25	250	45.948	12	55.42	238
16.0	54.324	56	22.81	323	22.177	104	58.03	28	59.790	65	36.55	270	46.012	64	52.81	261
25.9	54.439	115	19.47	334	22.335	158	57.98	5	59.908	118	33.70	285	46.129	117	50.05	276
Dec. 5.9	54.614	175	16.12	335	22.545	210	58.20	22	60.079	171	30.78	292	46.297	168	47.20	285
15.9	54.844	230	12.84	328	22.800	255	58.68	48	60.296	217	27.85	293	46.513	216	44.34	286
25.9	55.122	278	9.74	310	23.093	293	59.42	74	60.555	259	25.02	283	46.769	256	41.56	278
35.8	55.439	317	6.92	282	23.414	321	60.38	96	60.847	292	22.38	264	47.057	288	38.94	262
Mean Place	53.702		33.88		19.523		51.73		58.475		45.97		44.596		61.84	
Sec δ, Tan δ	1.319		+0.860		1.103		−0.466		1.125		+0.515		1.104		+0.470	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.05		+0.04		+0.07		−0.02		+0.05		+0.02		+0.05		+0.02	
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.3		−0.7		−0.3		−0.7		−0.3		−0.7		−0.3		−0.7	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	δ Boötis. Mag. 3.5				β Libræ. Mag. 2.7			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 15 12 s		° ′ +33 36 ″		h m 15 12 s		° ′ − 9 5 ″	
Jan. 0.9	13.937	312	46.52	261	38.992	305	6.42	157
10.8	14.249	334	43.91	224	39.297	317	7.99	159
20.8	14.583	344	41.67	179	39.614	322	9.58	154
30.8	14.927	345	39.88	127	39.936	319	11.12	143
Feb. 9.7	15.272	336	38.61	74	40.255	307	12.55	128
19.7	15.608	319	37.87	16	40.562	291	13.83	108
Mar. 1.7	15.927	293	37.71	39	40.853	270	14.91	88
11.7	16.220	264	38.10	92	41.123	245	15.79	64
21.6	16.484	232	39.02	138	41.368	220	16.43	43
31.6	16.716	195	40.40	179	41.588	193	16.86	20
Apr. 10.6	16.911	158	42.19	211	41.781	164	17.06	2
20.6	17.069	120	44.30	233	41.945	137	17.08	14
30.5	17.189	81	46.63	247	42.082	108	16.94	29
May 10.5	17.270	45	49.10	252	42.190	79	16.65	38
20.5	17.315	6	51.62	248	42.269	50	16.27	47
30.4	17.321	29	54.10	238	42.319	20	15.80	52
June 9.4	17.292	64	56.48	218	42.339	10	15.28	56
19.4	17.228	95	58.66	194	42.329	38	14.72	58
29.4	17.133	126	60.60	165	42.291	67	14.14	58
July 9.3	17.007	151	62.25	132	42.224	91	13.56	58
19.3	16.856	175	63.57	96	42.133	115	12.98	56
29.3	16.681	191	64.53	58	42.018	133	12.42	54
Aug. 8.3	16.490	202	65.11	18	41.885	146	11.88	50
18.2	16.288	207	65.29	22	41.739	152	11.38	46
28.2	16.081	204	65.07	63	41.587	151	10.92	40
Sept. 7.2	15.877	193	64.44	103	41.436	142	10.52	31
17.1	15.684	171	63.41	141	41.294	122	10.21	20
27.1	15.513	143	62.00	179	41.172	97	10.01	8
Oct. 7.1	15.370	105	60.21	215	41.075	60	9.93	7
17.1	15.265	59	58.06	246	41.015	19	10.00	27
27.0	15.206	9	55.60	272	40.996	29	10.27	45
Nov. 6.0	15.197	47	52.88	293	41.025	79	10.72	68
16.0	15.244	102	49.95	310	41.104	129	11.40	88
26.0	15.346	158	46.85	316	41.233	178	12.28	111
Dec. 5.9	15.504	209	43.69	313	41.411	221	13.39	128
15.9	15.713	256	40.56	301	41.632	259	14.67	143
25.9	15.969	291	37.55	280	41.891	287	16.10	153
35.8	16.260		34.75		42.178		17.63	
Mean Place	14.245		58.54		38.743		5.52	
Sec δ, Tan δ	1.201		+0.665		1.013		−0.160	
$D_\psi\alpha$, $D_\omega\alpha$	+0.05		+0.03		+0.06		−0.01	
$D_\psi\delta$, $D_\omega\delta$	−0.3		−0.7		−0.3		−0.7	

Washington Mean Time.	γ Ursæ Minoris. Mag. 3.1				μ Boötis pr. Mag. 4.5			
	Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 15 20 s		° ′ +72 6 ″		h m 15 21 s		° ′ +37 39 ″	
Jan. 0.9	47.45	60	62.99	265	25.357	314	25.82	269
10.8	48.05	68	60.34	213	25.671	338	23.13	231
20.8	48.73	74	58.21	152	26.009	352	20.82	184
30.8	49.47	76	56.69	85	26.361	356	18.98	130
Feb. 9.7	50.23	77	55.84	18	26.717	347	17.68	73
19.7	51.00	74	55.66	52	27.064	333	16.95	14
Mar. 1.7	51.74	68	56.18	115	27.397	309	16.81	45
11.7	52.42	62	57.33	176	27.706	281	17.26	100
21.6	53.04	53	59.09	227	27.987	246	18.26	149
31.6	53.57	42	61.36	269	28.233	210	19.75	190
Apr. 10.6	53.99	29	64.05	301	28.443	170	21.65	225
20.6	54.28	19	67.06	320	28.613	129	23.90	249
30.5	54.47	7	70.26	328	28.742	89	26.39	265
May 10.5	54.54	6	73.54	326	28.831	50	29.04	269
20.5	54.48	18	76.80	312	28.881	9	31.73	265
30.4	54.30	28	79.92	290	28.890	30	34.38	253
June 9.4	54.02	38	82.82	259	28.860	68	36.91	235
19.4	53.64	46	85.41	222	28.792	103	39.26	210
29.4	53.18	55	87.63	178	28.689	134	41.36	178
July 9.3	52.63	60	89.41	131	28.555	164	43.14	145
19.3	52.03	67	90.72	80	28.391	188	44.59	105
29.3	51.36	69	91.52	29	28.203	208	45.64	65
Aug. 8.3	50.67	70	91.81	24	27.995	220	46.29	23
18.2	49.97	71	91.57	77	27.775	226	46.52	20
28.2	49.26	69	90.80	129	27.549	224	46.32	63
Sept. 7.2	48.57	65	89.51	177	27.325	213	45.69	106
17.1	47.92	60	87.74	223	27.112	194	44.63	147
27.1	47.32	53	85.51	265	26.918	163	43.16	185
Oct. 7.1	46.79	44	82.86	302	26.755	126	41.31	223
17.1	46.35	35	79.84	331	26.629	80	39.08	256
27.0	46.00	21	76.53	356	26.549	27	36.52	283
Nov. 6.0	45.79	10	72.97	371	26.522	29	33.69	307
16.0	45.69	4	69.26	377	26.551	87	30.62	321
26.0	45.73	17	65.49	373	26.638	147	27.41	327
Dec. 5.9	45.90	31	61.76	357	26.785	201	24.14	325
15.9	46.21	44	58.19	332	26.986	250	20.89	312
25.9	46.65	54	54.87	294	27.236	291	17.77	289
35.8	47.19		51.93		27.527		14.88	
Mean Place	50.833		79.86		25.828		38.09	
Sec δ, Tan δ	3.257		+3.100		1.263		+0.772	
$D_\psi\alpha$, $D_\omega\alpha$	0.00		+0.13		+0.05		+0.03	
$D_\psi\delta$, $D_\omega\delta$	−0.3		−0.8		−0.3		−0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ^1 Serpentis. Mag. 5.5				ι Draconis. Mag. 3.5				32 Libræ. Mag. 5.9				β Coronæ Borealis. Mag. 3.7			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 15 22		° ′ +15 42		h m 15 23		° ′ +59 14		h m 15 23		° ′ −16 26		h m 15 24		° ′ +29 22	
	s		″		s		″		s		″		s		″	
Jan. 0.9	1.852	288	35.96	230	6.110	408	42.09	279	41.350	310	4.77	125	29.089	297	52.74	259
10.8	2.140	307	33.66	208	6.518	453	39.30	229	41.660	324	6.02	133	29.386	319	50.15	227
20.8	2.447	315	31.58	179	6.971	481	37.01	171	41.984	331	7.35	136	29.705	330	47.88	185
30.8	2.762	315	29.79	144	7.452	496	35.30	108	42.315	329	8.71	135	30.035	333	46.03	139
Feb. 9.8	3.077	306	28.35	102	7.948	490	34.22	41	42.644	319	10.06	127	30.368	327	44.64	87
19.7	3.383	292	27.33	60	8.438	474	33.81	27	42.963	303	11.33	115	30.695	311	43.77	33
Mar. 1.7	3.675	271	26.73	16	8.912	440	34.08	92	43.266	285	12.48	102	31.006	290	43.44	21
11.7	3.946	247	26.57	27	9.352	396	35.00	152	43.551	261	13.50	87	31.296	264	43.65	72
21.6	4.193	220	26.84	66	9.748	344	36.52	205	43.812	237	14.37	69	31.560	235	44.37	120
31.6	4.413	193	27.50	100	10.092	283	38.57	250	44.049	209	15.06	54	31.795	201	45.57	159
Apr. 10.6	4.606	162	28.50	131	10.375	218	41.07	282	44.258	183	15.60	39	31.996	168	47.16	192
20.6	4.768	133	29.81	153	10.593	149	43.89	307	44.441	153	15.99	23	32.164	132	49.08	217
30.5	4.901	101	31.34	169	10.742	80	46.96	318	44.594	125	16.22	13	32.296	98	51.25	232
May 10.5	5.002	70	33.03	178	10.822	12	50.14	319	44.719	95	16.35	2	32.394	60	53.57	240
20.5	5.072	40	34.81	180	10.834	55	53.33	309	44.814	64	16.37	7	32.454	25	55.97	239
30.5	5.112	8	36.61	177	10.779	118	56.42	292	44.878	33	16.30	13	32.479	9	58.36	231
June 9.4	5.120	22	38.38	166	10.661	177	59.34	264	44.911	3	16.17	21	32.470	44	60.67	214
19.4	5.098	52	40.04	155	10.484	230	61.98	231	44.914	30	15.96	26	32.426	76	62.81	196
29.4	5.046	80	41.59	137	10.254	279	64.29	190	44.884	60	15.70	31	32.350	107	64.77	168
July 9.3	4.966	106	42.96	116	9.975	320	66.19	146	44.824	88	15.39	36	32.243	134	66.45	139
19.3	4.860	128	44.12	94	9.655	353	67.65	99	44.736	114	15.03	40	32.109	159	67.84	106
29.3	4.732	147	45.06	68	9.302	376	68.64	49	44.622	134	14.63	44	31.950	178	68.90	71
Aug. 8.3	4.585	161	45.74	42	8.926	391	69.13	4	44.488	149	14.19	47	31.772	190	69.61	34
18.2	4.424	168	46.16	14	8.535	396	69.09	53	44.339	158	13.72	50	31.582	198	69.95	3
28.2	4.256	168	46.30	14	8.139	389	68.56	105	44.181	159	13.22	51	31.384	198	69.92	43
Sept. 7.2	4.088	159	46.16	42	7.750	371	67.51	153	44.022	151	12.71	51	31.186	188	69.49	81
17.2	3.929	143	45.74	73	7.379	339	65.98	200	43.871	133	12.20	47	30.998	170	68.68	118
27.1	3.786	118	45.01	103	7.040	296	63.98	243	43.738	106	11.73	40	30.828	143	67.50	155
Oct. 7.1	3.668	84	43.98	131	6.744	241	61.55	280	43.632	70	11.33	31	30.685	109	65.95	189
17.1	3.584	43	42.67	159	6.503	176	58.75	315	43.562	27	11.02	17	30.576	66	64.06	221
27.0	3.541	2	41.08	184	6.327	102	55.60	342	43.535	21	10.85	1	30.510	17	61.85	250
Nov. 6.0	3.543	52	39.24	209	6.225	23	52.18	360	43.556	72	10.84	19	30.493	36	59.35	272
16.0	3.595	103	37.15	227	6.202	64	48.58	371	43.628	125	11.03	39	30.529	90	56.63	289
26.0	3.698	152	34.88	241	6.266	148	44.87	370	43.753	175	11.42	62	30.619	145	53.74	300
Dec. 5.9	3.850	198	32.47	248	6.414	231	41.17	360	43.928	221	12.04	83	30.764	195	50.74	301
15.9	4.048	238	29.99	248	6.645	306	37.57	338	44.149	261	12.87	102	30.959	239	47.73	293
25.9	4.286	271	27.51	242	6.951	373	34.19	304	44.410	291	13.89	119	31.198	276	44.80	275
35.9	4.557		25.09		7.324		31.15		44.701		15.08		31.474		42.05	
Mean Place	1.883		43.20		7.660		57.64		41.112		6.06		29.370		63.08	
Sec δ, Tan δ	1.039		+0.281		1.956		+1.680		1.043		−0.295		1.148		+0.563	
$D_\psi a$, $D_\omega a$	+0.06		+0.01		+0.03		+0.07		+0.07		−0.01		+0.05		+0.02	
$D_\psi \delta$, $D_\omega \delta$	−0.3		−0.8		−0.3		−0.8		−0.3		−0.8		−0.2		−0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ν^1 Boötis. Mag. 5.2				γ Lupi (*mean*). Mag. 3.0				γ Libræ. Mag. 4.0				α Coronæ Borealis. Mag. 2.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 15 28		° ′ +41 6		h m 15 29		° ′ −40 53		h m 15 30		° ′ −14 31		h m 15 31		° ′ +26 58	
	s		″		s		″		s		″		s		″	
Jan. 0.9	0.574		18.18		44.438		37.36		59.759		11.66		15.205		61.97	
10.8	0.890	316	15.40	278	44.814	376	37.57	21	60.061	302	12.94	128	15.495	290	59.39	258
20.8	1.235	345	13.03	237	45.212	398	38.06	49	60.380	319	14.29	135	15.807	312	57.12	227
30.8	1.596	361	11.16	187	45.618	406	38.83	77	60.706	326	15.65	136	16.132	325	55.22	190
Feb. 9.8	1.963	367	9.83	133	46.025	407	39.83	100	61.031	325	16.96	131	16.460	328	53.78	144
19.7	2.325	362	9.09	74	46.421	396	41.03	120	61.348	317	18.17	121	16.782	322	52.85	93
Mar. 1.7	2.672	347	8.96	13	46.802	381	42.38	135	61.651	303	19.27	110	17.091	309	52.44	41
11.7	2.998	326	9.45	49	47.159	357	43.84	146	61.936	285	20.21	94	17.381	290	52.54	10
21.7	3.293	295	10.49	104	47.491	332	45.38	154	62.199	263	20.97	76	17.646	265	53.15	61
31.6	3.554	261	12.05	156	47.794	303	46.96	158	62.439	240	21.56	59	17.883	237	54.23	108
Apr. 10.6	3.776	222	14.05	200	48.065	271	48.57	161	62.653	214	21.97	41	18.089	206	55.71	148
20.6	3.957	181	16.39	234	48.301	236	50.16	159	62.840	187	22.21	24	18.263	174	57.51	180
30.5	4.098	141	19.00	261	48.503	202	51.72	156	62.999	159	22.32	11	18.404	141	59.58	207
May 10.5	4.194	96	21.76	276	48.666	163	53.23	151	63.129	130	22.31	1	18.509	105	61.80	222
20.5	4.246	52	24.57	281	48.790	124	54.67	144	63.231	102	22.20	11	18.580	71	64.11	231
30.5	4.256	10	27.36	279	48.874	84	56.01	134	63.301	70	22.01	19	18.615	35	66.43	232
June 9.4	4.224	32	30.01	265	48.917	43	57.22	121	63.341	40	21.74	27	18.617	2	68.68	225
19.4	4.152	72	32.48	247	48.918	1	58.30	108	63.348	7	21.43	31	18.584	33	70.79	211
29.4	4.043	109	34.68	220	48.876	42	59.20	90	63.323	25	21.08	35	18.519	65	72.72	193
July 9.4	3.899	144	36.57	189	48.795	81	59.90	70	63.269	54	20.70	38	18.423	96	74.40	168
19.3	3.724	175	38.09	152	48.675	120	60.38	48	63.184	85	20.29	41	18.298	125	75.81	141
29.3	3.521	203	39.21	112	48.522	153	60.62	24	63.074	110	19.86	43	18.149	149	76.91	110
Aug. 8.3	3.299	222	39.90	69	48.343	179	60.61	1	62.942	132	19.41	45	17.979	170	77.66	75
18.2	3.062	237	40.16	26	48.144	199	60.31	30	62.794	148	18.94	47	17.795	184	78.08	42
28.2	2.818	244	39.97	19	47.933	211	59.77	54	62.636	158	18.46	48	17.603	192	78.13	5
Sept. 7.2	2.576	242	39.34	63	47.723	210	58.96	81	62.477	159	18.00	46	17.410	193	77.80	33
17.2	2.343	233	38.25	109	47.523	200	57.94	102	62.324	153	17.56	44	17.224	186	77.10	70
27.1	2.131	212	36.74	151	47.348	175	56.71	123	62.188	136	17.17	39	17.056	168	76.04	106
Oct. 7.1	1.948	183	34.83	191	47.204	144	55.35	136	62.078	110	16.86	31	16.913	143	74.63	141
17.1	1.804	144	32.53	230	47.106	98	53.91	144	62.002	76	16.66	20	16.803	110	72.86	177
27.1	1.707	97	29.88	265	47.063	43	52.44	147	61.968	34	16.59	7	16.735	68	70.78	208
Nov. 6.0	1.665	42	26.96	292	47.080	17	51.02	142	61.981	13	16.69	10	16.715	20	68.42	236
16.0	1.681	16	23.80	316	47.161	81	49.72	130	62.045	64	16.99	30	16.747	32	65.81	261
26.0	1.757	76	20.49	331	47.309	148	48.61	111	62.161	116	17.49	50	16.832	85	63.03	278
Dec. 5.9	1.896	139	17.11	338	47.517	208	47.72	89	62.327	166	18.20	71	16.970	138	60.13	290
15.9	2.091	195	13.76	335	47.783	266	47.12	60	62.540	213	19.10	90	17.158	188	57.20	293
25.9	2.338	247	10.55	321	48.098	315	46.82	30	62.792	252	20.18	108	17.390	232	54.33	287
35.9	2.630	292	7.58	297	48.452	354	46.82	0	63.074	282	21.41	123	17.660	270	51.61	272
Mean Place	1.192		30.63		44.205		44.58		59.562		12.57		15.471		71.37	
Sec δ, Tan δ	1.327		+0.872		1.323		−0.866		1.033		−0.259		1.122		+0.508	
$D_\psi a$, $D_\omega a$	+0.04		+0.04		+0.08		−0.04		+0.07		−0.01		+0.05		+0.02	
$D_\psi \delta$, $D_\omega \delta$	−0.2		−0.8		−0.2		−0.8		−0.2		−0.8		−0.2		−0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Triang. Aust. Mag. 3.0 Right Ascension.		β Triang. Aust. Declination.		λ Libræ. Mag. 5.1 Right Ascension.		λ Libræ. Declination.		γ Serpentis. Mag. 3.9 Right Ascension.		γ Serpentis. Declination.		π Scorpii. Mag. 3.0 Right Ascension.		π Scorpii. Declination.	
	h m 15 47		° ′ −63 10		h m 15 48		° ′ −19 55		h m 15 52		° ′ +15 55		h m 15 53		° ′ −25 52	
	s		″		s		″		s		″		s		″	
Jan. 0.9	59.31	56	44.83	91	37.851	301	31.39	95	42.477	268	24.75	237	57.028	310	51.29	66
10.9	59.87	60	43.92	48	38.152	319	32.34	107	42.745	292	22.38	216	57.338	330	51.95	81
20.8	60.47	63	43.44	5	38.471	331	33.41	113	43.037	306	20.22	189	57.668	343	52.76	93
30.8	61.10	63	43.39	37	38.802	334	34.54	114	43.343	311	18.33	155	58.011	346	53.69	100
Feb. 9.8	61.73	64	43.76	77	39.136	328	35.68	112	43.654	308	16.78	114	58.357	343	54.69	104
19.7	62.37	61	44.53	114	39.464	317	36.80	105	43.962	299	15.64	71	58.700	332	55.73	105
Mar. 1.7	62.98	59	45.67	145	39.781	300	37.85	95	44.261	285	14.93	27	59.032	316	56.78	101
11.7	63.57	56	47.12	175	40.081	282	38.80	83	44.546	264	14.66	17	59.348	297	57.79	95
21.7	64.13	51	48.87	198	40.363	259	39.63	70	44.810	243	14.83	59	59.645	275	58.74	89
31.6	64.64	46	50.85	218	40.622	236	40.33	58	45.053	217	15.42	95	59.920	250	59.63	80
Apr. 10.6	65.10	40	53.03	233	40.858	209	40.91	46	45.270	191	16.37	128	60.170	224	60.43	71
20.6	65.50	35	55.36	244	41.067	182	41.37	34	45.461	161	17.65	153	60.394	196	61.14	64
30.6	65.85	28	57.80	249	41.249	153	41.71	25	45.622	132	19.18	174	60.590	165	61.78	57
May 10.5	66.13	21	60.29	249	41.402	123	41.96	15	45.754	100	20.90	182	60.755	135	62.35	49
20.5	66.34	13	62.78	245	41.525	92	42.11	8	45.854	68	22.72	188	60.890	101	62.84	43
30.5	66.47	6	65.23	235	41.617	57	42.19	3	45.922	37	24.60	186	60.991	66	63.27	36
June 9.4	66.53	1	67.58	219	41.674	24	42.22	3	45.959	3	26.46	179	61.057	30	63.63	29
19.4	66.52	8	69.77	198	41.698	11	42.19	9	45.962	31	28.25	166	61.087	7	63.92	20
29.4	66.44	16	71.75	171	41.687	43	42.10	15	45.931	62	29.91	150	61.080	42	64.12	14
July 9.4	66.28	23	73.46	138	41.644	77	41.95	21	45.869	91	31.41	130	61.038	77	64.26	3
19.3	66.05	29	74.84	103	41.567	107	41.74	26	45.778	118	32.71	106	60.961	110	64.29	7
29.3	65.76	33	75.87	62	41.460	131	41.48	31	45.660	142	33.77	81	60.851	136	64.22	18
Aug. 8.3	65.43	37	76.49	19	41.329	151	41.17	38	45.518	161	34.58	56	60.715	159	64.04	29
18.3	65.06	38	76.68	25	41.178	165	40.79	43	45.357	172	35.14	26	60.556	172	63.75	40
28.2	64.68	40	76.43	69	41.013	169	40.36	48	45.185	177	35.40	2	60.384	178	63.35	51
Sept. 7.2	64.28	37	75.74	112	40.844	164	39.88	51	45.008	174	35.38	32	60.206	175	62.84	60
17.2	63.91	35	74.62	151	40.680	152	39.37	52	44.834	160	35.06	62	60.031	159	62.24	67
27.1	63.56	29	73.11	185	40.528	125	38.85	50	44.674	140	34.44	92	59.872	136	61.57	72
Oct. 7.1	63.27	21	71.26	214	40.403	94	38.35	45	44.534	109	33.52	123	59.736	101	60.85	70
17.1	63.06	14	69.12	232	40.309	51	37.90	36	44.425	72	32.29	151	59.635	58	60.15	66
27.1	62.92	4	66.80	242	40.258	3	37.54	22	44.353	28	30.78	178	59.577	8	59.49	58
Nov. 6.0	62.88	6	64.38	243	40.255	50	37.32	8	44.325	21	29.00	204	59.569	47	58.91	44
16.0	62.94	17	61.95	234	40.305	102	37.24	12	44.346	71	26.96	223	59.616	101	58.47	27
26.0	63.11	27	59.61	215	40.407	155	37.36	30	44.417	122	24.73	239	59.717	156	58.20	9
Dec. 6.0	63.38	36	57.46	189	40.562	204	37.66	50	44.539	171	22.34	249	59.873	208	58.11	13
15.9	63.74	45	55.57	155	40.766	245	38.16	71	44.710	212	19.85	251	60.081	253	58.24	34
25.9	64.19	51	54.02	116	41.011	280	38.87	87	44.922	248	17.34	245	60.333	287	58.58	53
35.9	64.70		52.86		41.291		39.74		45.170		14.89		60.620		59.11	
Mean Place	59.525		55.58		37.706		33.86		42.646		30.52		56.891		55.16	
Sec δ, Tan δ	2.217		−1.978		1.064		−0.363		1.040		+0.285		1.111		−0.485	
$D_\psi a$, $D_\omega a$	+0.10		−0.07		+0.07		−0.01		+0.05		+0.01		+0.07		−0.02	
$D_\psi \delta$, $D_\omega \delta$	−0.2		−0.8		−0.2		−0.8		−0.2		−0.8		−0.2		−0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Coronæ Borealis. Mag. 4.2 Right Ascension.		Declination.		δ Scorpii. Mag. 2.5 Right Ascension.		Declination.		θ Draconis. Mag. 4.1 Right Ascension.		Declination.		β Scorpii. Mag. 2.9 Right Ascension.		Declination.	
	h m 15 54		° ′ +27 6		h m 15 55		° ′ −22 23		h m 16 0		° ′ +58 46		h m 16 0		° ′ −19 35	
	s		″		s		″		s		″		s		″	
Jan. 0.9	13.595	273	33.84	264	32.540	301	28.89	80	20.398	351	40.23	305	43.503	292	2.48	90
10.9	13.868	299	31.20	237	32.841	321	29.69	93	20.749	407	37.18	261	43.795	314	3.38	100
20.8	14.167	315	28.83	199	33.162	334	30.62	101	21.156	447	34.57	210	44.109	325	4.38	105
30.8	14.482	323	26.84	156	33.496	337	31.63	105	21.603	471	32.47	149	44.434	331	5.43	107
Feb. 9.8	14.805	322	25.28	106	33.833	334	32.68	106	22.074	482	30.98	83	44.765	328	6.50	104
19.8	15.127	314	24.22	54	34.167	324	33.74	101	22.556	476	30.15	17	45.093	319	7.54	96
Mar. 1.7	15.441	297	23.68	0	34.491	308	34.75	95	23.032	457	29.98	52	45.412	304	8.50	87
11.7	15.738	279	23.68	51	34.799	291	35.70	85	23.489	427	30.50	114	45.716	287	9.37	74
21.7	16.017	252	24.19	90	35.090	269	36.55	75	23.916	383	31.64	174	46.003	267	10.11	63
31.6	16.269	226	25.18	141	35.359	245	37.30	64	24.299	333	33.38	224	46.270	245	10.74	50
Apr. 10.6	16.495	195	26.59	178	35.604	219	37.94	54	24.632	273	35.62	266	46.515	219	11.24	37
20.6	16.690	163	28.37	207	35.823	193	38.48	45	24.905	212	38.28	297	46.734	194	11.61	27
30.6	16.853	128	30.44	225	36.016	163	38.93	36	25.117	144	41.25	317	46.928	164	11.88	18
May 10.5	16.981	95	32.69	237	36.179	133	39.29	29	25.261	78	44.42	326	47.092	135	12.06	9
20.5	17.076	58	35.06	240	36.312	100	39.58	20	25.339	10	47.68	326	47.227	103	12.15	4
30.5	17.134	23	37.46	236	36.412	65	39.78	16	25.349	57	50.94	315	47.330	69	12.19	2
June 9.5	17.157	14	39.82	225	36.477	30	39.94	10	25.292	121	54.09	294	47.399	35	12.17	6
19.4	17.143	48	42.07	207	36.507	4	40.04	3	25.171	181	57.03	266	47.434	0	12.11	11
29.4	17.095	83	44.14	185	36.503	41	40.07	3	24.990	237	59.69	233	47.434	37	12.00	15
July 9.4	17.012	114	45.99	158	36.462	74	40.04	9	24.753	287	62.02	192	47.397	70	11.85	19
19.3	16.898	142	47.57	127	36.388	106	39.95	17	24.466	329	63.94	148	47.327	99	11.66	25
29.3	16.756	167	48.84	95	36.282	131	39.78	26	24.137	364	65.42	100	47.228	129	11.41	30
Aug. 8.3	16.589	184	49.79	59	36.151	153	39.52	32	23.773	389	66.42	51	47.099	149	11.11	34
18.3	16.405	197	50.38	23	35.998	169	39.20	41	23.384	404	66.93	2	46.950	165	10.77	39
28.2	16.208	201	50.61	15	35.829	173	38.79	48	22.980	408	66.91	52	46.785	171	10.38	44
Sept. 7.2	16.007	197	50.46	53	35.656	170	38.31	53	22.572	398	66.39	104	46.614	168	9.94	46
17.2	15.810	185	49.93	89	35.486	156	37.78	57	22.174	378	65.35	152	46.446	156	9.48	48
27.2	15.625	161	49.04	127	35.330	132	37.21	57	21.796	343	63.83	199	46.290	134	9.00	46
Oct. 7.1	15.464	131	47.77	163	35.198	100	36.64	55	21.453	297	61.84	243	46.156	102	8.54	41
17.1	15.333	91	46.14	196	35.098	58	36.09	48	21.156	237	59.41	281	46.054	61	8.13	33
27.1	15.242	45	44.18	226	35.040	9	35.61	38	20.919	171	56.60	316	45.993	15	7.80	21
Nov. 6.0	15.197	5	41.92	252	35.031	43	35.23	22	20.748	92	53.44	341	45.978	36	7.59	7
16.0	15.202	59	39.40	273	35.074	98	35.01	7	20.656	10	50.03	360	46.014	90	7.52	10
26.0	15.261	112	36.67	286	35.172	150	34.94	13	20.646	74	46.43	368	46.104	143	7.62	29
Dec. 6.0	15.373	164	33.81	293	35.322	200	35.07	34	20.720	159	42.75	365	46.247	191	7.91	47
15.9	15.537	210	30.88	289	35.522	244	35.41	52	20.879	240	39.10	351	46.438	234	8.38	67
25.9	15.747	249	27.99	278	35.766	279	35.93	71	21.119	311	35.59	327	46.672	270	9.05	82
35.9	15.996		25.21		36.045		36.64		21.430		32.32		46.942		9.87	
Mean Place	13.973		41.85		32.417		31.98		22.222		52.48		43.408		5.00	
Sec δ, Tan δ	1.123		+0.512		1.082		−0.412		1.929		+1.650		1.061		−0.356	
$D_\psi a$, $D_\omega a$	+0.05		+0.02		+0.07		−0.01		+0.02		+0.06		+0.07		−0.01	
$D_\psi \delta$, $D_\omega \delta$	−0.2		−0.9		−0.2		−0.9		−0.2		−0.9		−0.2		−0.9	

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FOR THE UPPER TRANSIT AT .

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Ophiuchi. Mag. 3.3 Right Ascension.		ε Ophiuchi. Mag. 3.3 Declination.		σ Scorpii. Mag. 3.1 Right Ascension.		σ Scorpii. Mag. 3.1 Declination.		τ Herculis. Mag. 3.9 Right Ascension.		τ Herculis. Mag. 3.9 Declination.		γ Herculis. Mag. 3.8 Right Ascension.		γ Herculis. Mag. 3.8 Declination.	
	h m 16 14		° ′ − 4 29		h m 16 16		° ′ −25 23		h m 16 17		° ′ +46 29		h m 16 18		° ′ +19 20	
	s		″		s		″		s		″		s		″	
Jan. 0.9	1.983		46.15		15.752		54.62		17.249		70.75		20.442		27.66	
10.9	2.246	263	47.68	153	16.045	293	55.13	51	17.530	281	67.68	307	20.692	250	25.21	245
20.8	2.531	285	49.17	149	16.362	317	55.80	67	17.853	323	64.96	272	20.969	277	22.95	226
30.8	2.831	300	50.58	141	16.695	333	56.56	76	18.207	354	62.70	226	21.264	295	20.99	196
Feb. 9.8	3.139	308	51.85	127	17.035	340	57.40	84	18.580	373	60.97	173	21.571	307	19.40	159
		307		107		341		86		382		113		308		119
19.8	3.446		52.92		17.376		58.26		18.962		59.84		21.879		18.21	
Mar. 1.7	3.746	300	53.77	85	17.710	334	59.12	86	19.342	380	59.36	48	22.183	304	17.49	72
11.7	4.035	289	54.35	58	18.032	322	59.95	83	19.712	370	59.50	14	22.477	294	17.24	25
21.7	4.310	275	54.67	32	18.338	306	60.73	78	20.060	348	60.27	77	22.756	279	17.47	23
31.7	4.567	257	54.74	7	18.627	289	61.43	70	20.381	321	61.63	136	23.015	259	18.15	68
		236		19		266		64		287		187		237		109
Apr. 10.6	4.803		54.55		18.893		62.07		20.668		63.50		23.252		19.24	
20.6	5.016	213	54.15	40	19.136	243	62.63	56	20.915	247	65.82	232	23.464	212	20.67	143
30.6	5.207	191	53.57	58	19.351	215	63.13	50	21.120	205	68.48	266	23.648	184	22.40	173
May 10.5	5.368	161	52.84	73	19.540	189	63.57	44	21.279	159	71.37	289	23.802	154	24.34	194
20.5	5.502	134	52.01	83	19.697	157	63.95	38	21.390	111	74.42	305	23.925	123	26.42	208
		104		89		123		33		62		309		90		214
30.5	5.606		51.12		19.820		64.28		21.452		77.51		24.015		28.56	
June 9.5	5.678	72	50.21	91	19.910	90	64.57	29	21.465	13	80.54	303	24.070	55	30.70	214
19.4	5.717	39	49.29	92	19.961	51	64.82	25	21.427	38	83.44	290	24.090	20	32.77	207
29.4	5.722	5	48.40	89	19.974	13	65.00	18	21.343	84	86.11	267	24.074	16	34.72	195
July 9.4	5.693	29	47.57	83	19.950	24	65.14	14	21.212	131	88.51	240	24.024	50	36.50	178
		61		78		63		7		172		205		84		156
19.4	5.632		46.79		19.887		65.21		21.040		90.56		23.940		38.06	
29.3	5.540	92	46.10	69	19.791	96	65.20	1	20.831	209	92.23	167	23.825	115	39.38	132
Aug. 8.3	5.420	120	45.49	61	19.663	128	65.10	10	20.589	242	93.47	124	23.684	141	40.43	105
18.3	5.279	141	44.97	52	19.511	152	64.89	21	20.321	268	94.25	78	23.519	165	41.18	75
28.2	5.123	156	44.56	41	19.339	172	64.59	30	20.037	284	94.57	32	23.339	180	41.62	44
		167		30		181		40		292		16		188		13
Sept. 7.2	4.956		44.26		19.158		64.19		19.745		94.41		23.151		41.75	
17.2	4.791	165	44.08	18	18.977	181	63.71	48	19.454	291	93.76	65	22.962	189	41.54	21
27.2	4.635	156	44.03	5	18.807	170	63.15	56	19.176	278	92.64	112	22.782	180	41.01	53
Oct. 7.1	4.497	138	44.12	9	18.657	150	62.54	61	18.921	255	91.06	158	22.621	161	40.14	87
17.1	4.388	109	44.38	26	18.539	118	61.92	62	18.701	220	89.04	202	22.485	136	38.95	119
		74		42		78		60		177		242		99		151
27.1	4.314		44.80		18.461		61.32		18.524		86.62		22.386		37.44	
Nov. 6.1	4.283	31	45.41	61	18.430	31	60.78	54	18.399	125	83.85	277	22.329	57	35.64	180
16.0	4.300	17	46.22	81	18.452	22	60.34	44	18.335	64	80.77	308	22.320	9	33.57	207
26.0	4.366	66	47.21	99	18.530	78	60.05	29	18.335	0	77.47	330	22.361	41	31.29	228
Dec. 6.0	4.481	115	48.39	118	18.662	132	59.92	13	18.400	65	74.03	344	22.454	93	28.83	246
		163		133		184		5		130		349		143		258
15.9	4.644		49.72		18.846		59.97		18.530		70.54		22.597		26.25	
25.9	4.850	206	51.16	144	19.077	231	60.21	24	18.724	194	67.11	343	22.783	186	23.66	259
35.9	5.090	240	52.66	150	19.346	269	60.63	42	18.973	249	63.86	325	23.010	227	21.13	253
Mean Place	2.014		45.65		15.705		58.44		18.362		80.14		20.767		32.74	
Sec δ, Tan δ	1.003		−0.079		1.107		−0.475		1.453		+1.054		1.060		+0.351	
$D_{\psi}a$, $D_{\omega}a$	+0.06		0.00		+0.07		−0.01		+0.04		+0.03		+0.05		+0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.2		−0.9		−0.2		−0.9		−0.2		−0.9		−0.2		−0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	η Ursæ Minoris. Mag. 5.0				γ Apodis. Mag. 3.9				ω Herculis. Mag. 4.5				η Draconis. Mag. 2.9			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 16 19		° ′ +75 56		h m 16 20		° ′ −78 42		h m 16 21		° ′ +14 12		h m 16 22		° ′ +61 41	
	s		″		s		″		s		″		s		″	
Jan. 0.9	45.58	55	21.76	307	56.64	107	53.25	189	40.115	248	64.04	227	51.22	34	39.74	319
10.9	46.13	68	18.69	264	57.71	119	51.36	144	40.363	273	61.77	211	51.56	40	36.55	280
20.9	46.81	79	16.05	214	58.90	129	49.92	97	40.636	291	59.66	187	51.96	45	33.75	230
30.8	47.60	88	13.91	154	60.19	135	48.95	48	40.927	300	57.79	155	52.41	50	31.45	172
Feb. 9.8	48.48	93	12.37	88	61.54	139	48.47	3	41.227	304	56.24	118	52.91	51	29.73	108
19.8	49.41	93	11.49	22	62.93	138	48.50	49	41.531	300	55.06	77	53.42	52	28.65	40
Mar. 1.7	50.34	92	11.27	47	64.31	135	48.99	93	41.831	291	54.29	33	53.94	49	28.25	28
11.7	51.26	86	11.74	111	65.66	129	49.92	136	42.122	276	53.96	10	54.43	48	28.53	95
21.7	52.12	79	12.85	170	66.95	122	51.28	174	42.398	256	54.06	52	54.91	44	29.48	154
31.7	52.91	69	14.55	223	68.17	111	53.02	208	42.654	237	54.58	89	55.35	39	31.02	210
Apr. 10.6	53.60	57	16.78	267	69.28	100	55.10	236	42.891	213	55.47	123	55.74	33	33.12	255
20.6	54.17	41	19.45	300	70.28	87	57.46	260	43.104	187	56.70	149	56.07	27	35.67	290
30.6	54.58	28	22.45	321	71.15	71	60.06	278	43.291	158	58.19	171	56.34	19	38.57	316
May 10.6	54.86	13	25.66	333	71.86	54	62.84	289	43.449	129	59.90	184	56.53	12	41.73	330
20.5	54.99	4	28.99	334	72.40	38	65.73	295	43.578	97	61.74	191	56.65	5	45.03	333
30.5	54.95	18	32.33	324	72.78	19	68.68	292	43.675	62	63.65	191	56.70	4	48.36	327
June 9.5	54.77	33	35.57	304	72.97	1	71.60	285	43.737	29	65.56	187	56.66	10	51.63	310
19.4	54.44	46	38.61	279	72.98	17	74.45	267	43.766	4	67.43	176	56.56	18	54.73	286
29.4	53.98	60	41.40	242	72.81	36	77.12	245	43.762	40	69.19	162	56.38	24	57.59	255
July 9.4	53.38	69	43.82	204	72.45	51	79.57	212	43.722	74	70.81	144	56.14	30	60.14	217
19.4	52.69	79	45.86	159	71.94	67	81.69	176	43.648	104	72.25	121	55.84	35	62.31	174
29.3	51.90	86	47.45	111	71.27	80	83.45	132	43.544	132	73.46	99	55.49	39	64.05	128
Aug. 8.3	51.04	92	48.56	61	70.47	90	84.77	84	43.412	154	74.45	72	55.10	43	65.33	79
18.3	50.12	96	49.17	9	69.57	95	85.61	32	43.258	172	75.17	46	54.67	45	66.12	27
28.3	49.16	96	49.26	43	68.62	99	85.93	23	43.086	180	75.63	18	54.22	46	66.39	24
Sept. 7.2	48.20	94	48.83	95	67.63	98	85.70	76	42.906	181	75.81	11	53.76	45	66.15	77
17.2	47.26	91	47.88	144	66.65	93	84.94	129	42.725	174	75.70	39	53.31	45	65.38	127
27.2	46.35	85	46.44	192	65.72	83	83.65	178	42.551	156	75.31	70	52.86	40	64.11	176
Oct. 7.1	45.50	77	44.52	236	64.89	68	81.87	221	42.395	129	74.61	98	52.46	37	62.35	223
17.1	44.73	66	42.16	276	64.21	53	79.66	256	42.266	96	73.63	128	52.09	31	60.12	265
27.1	44.07	53	39.40	310	63.68	32	77.10	281	42.170	53	72.35	156	51.78	23	57.47	301
Nov. 6.1	43.54	38	36.30	336	63.36	11	74.29	297	42.117	6	70.79	180	51.55	16	54.46	330
16.0	43.16	23	32.94	357	63.25	13	71.32	300	42.111	43	68.99	203	51.39	6	51.16	355
26.0	42.93	5	29.37	365	63.38	35	68.32	294	42.154	93	66.96	220	51.33	2	47.61	366
Dec. 6.0	42.88	12	25.72	365	63.73	58	65.38	276	42.247	142	64.76	232	51.35	12	43.95	368
15.9	43.00	29	22.07	351	64.31	78	62.62	249	42.389	186	62.44	236	51.47	20	40.27	359
25.9	43.29	47	18.56	329	65.09	95	60.13	213	42.575	225	60.08	235	51.67	29	36.68	339
35.9	43.76		15.27		66.04		58.00		42.800		57.73		51.96		33.29	
Mean Place	51.167		33.09		58.848		64.41		40.369		67.98		53.507		50.09	
Sec δ, Tan δ	4.117		+3.993		5.112		−5.014		1.032		+0.253		2.109		+1.857	
$D_\psi\alpha$, $D_\omega\alpha$	−0.03		+0.11		+0.18		−0.14		+0.05		+0.01		+0.02		+0.05	
$D_\psi\delta$, $D_\omega\delta$	−0.2		−0.9		−0.2		−0.9		−0.2		−0.9		−0.2		−0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ Scorpii. Mag. 2.9 Right Ascension.		τ Scorpii. Declination.		σ Herculis. Mag. 4.2 Right Ascension.		σ Herculis. Declination.		ζ Ophiuchi. Mag. 2.7 Right Ascension.		ζ Ophiuchi. Declination.		24 Scorpii. Mag. 5.0 Right Ascension.		24 Scorpii. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	16 30		−28 2		16 31		+42 35		16 32		−10 24		16 36		−17 35	
	s		″		s		″		s		″		s		″	
Jan. 0.9	50.195		52.63		28.482		64.03		41.742		13.44		53.116		8.58	
10.9	50.482	287	52.91	28	28.739	257	60.96	307	41.997	255	14.62	118	53.378	262	9.36	78
20.9	50.797	315	53.34	43	29.037	298	58.21	275	42.277	280	15.81	119	53.665	287	10.21	85
30.8	51.130	333	53.89	55	29.364	327	55.87	234	42.575	298	16.96	115	53.972	307	11.10	89
Feb. 9.8	51.474	344	54.54	65	29.714	350	54.04	183	42.883	308	18.03	107	54.289	317	11.98	88
19.8	51.820	346	55.25	71	30.074	360	52.77	127	43.193	310	18.98	95	54.609	320	12.80	82
Mar. 1.7	52.162	342	55.98	73	30.435	361	52.11	66	43.499	306	19.76	78	54.926	317	13.53	73
11.7	52.496	334	56.71	73	30.787	352	52.09	2	43.798	299	20.35	59	55.236	310	14.15	62
21.7	52.816	320	57.41	70	31.125	338	52.67	−58	44.085	287	20.74	39	55.534	298	14.64	49
31.7	53.118	302	58.08	67	31.439	314	53.84	117	44.357	272	20.91	17	55.817	283	15.00	36
Apr. 10.6	53.402	284	58.71	63	31.726	287	55.54	170	44.609	252	20.89	−2	56.082	265	15.21	21
20.6	53.662	260	59.29	58	31.978	252	57.68	214	44.842	233	20.69	20	56.327	245	15.31	10
30.6	53.897	235	59.84	55	32.192	214	60.20	252	45.052	210	20.34	35	56.548	221	15.30	−1
May 10.6	54.103	206	60.35	51	32.365	173	62.97	277	45.236	184	19.88	46	56.744	196	15.21	9
20.5	54.278	175	60.82	47	32.495	130	65.92	295	45.392	156	19.34	54	56.911	167	15.06	15
30.5	54.421	143	61.26	44	32.579	84	68.94	302	45.518	126	18.73	61	57.048	137	14.86	20
June 9.5	54.526	105	61.68	42	32.617	38	71.93	299	45.612	94	18.10	63	57.151	103	14.63	23
19.4	54.593	67	62.05	37	32.608	−9	74.82	289	45.671	59	17.46	64	57.219	68	14.39	24
29.4	54.620	27	62.39	34	32.553	55	77.54	272	45.694	23	16.84	62	57.249	30	14.15	24
July 9.4	54.606	−14	62.68	29	32.453	100	79.99	245	45.681	−13	16.25	59	57.241	−8	13.91	24
19.4	54.553	53	62.89	21	32.313	140	82.13	214	45.634	47	15.69	56	57.198	43	13.66	25
29.3	54.463	90	63.02	13	32.133	180	83.91	178	45.552	82	15.17	52	57.118	80	13.41	25
Aug. 8.3	54.338	125	63.05	3	31.919	214	85.30	139	45.440	112	14.70	47	57.006	112	13.15	26
18.3	54.186	152	62.96	−9	31.679	240	86.26	96	45.303	137	14.28	42	56.867	139	12.88	27
28.3	54.011	175	62.76	20	31.419	260	86.77	51	45.147	156	13.91	37	56.707	160	12.58	30
Sept. 7.2	53.824	187	62.44	32	31.149	270	86.81	4	44.978	169	13.59	32	56.534	173	12.27	31
17.2	53.635	189	62.00	44	30.877	272	86.38	−43	44.807	171	13.34	25	56.358	176	11.95	32
27.2	53.454	181	61.45	55	30.615	262	85.49	89	44.644	163	13.15	19	56.189	169	11.63	32
Oct. 7.1	53.292	162	60.82	63	30.370	245	84.14	135	44.496	148	13.05	10	56.035	154	11.33	30
17.1	53.161	131	60.15	67	30.157	213	82.35	179	44.374	122	13.05	0	55.909	126	11.06	27
27.1	53.067	94	59.46	69	29.983	174	80.15	220	44.287	87	13.18	13	55.816	93	10.87	19
Nov. 6.1	53.022	45	58.79	67	29.857	126	77.58	257	44.242	45	13.46	28	55.767	49	10.76	11
16.0	53.029	−7	58.19	60	29.787	70	74.70	288	44.244	−2	13.89	43	55.768	−1	10.77	−1
26.0	53.092	63	57.71	48	29.776	11	71.56	314	44.296	52	14.48	59	55.820	52	10.91	14
Dec. 6.0	53.211	119	57.36	35	29.829	−53	68.26	330	44.398	102	15.24	76	55.923	103	11.21	30
16.0	53.385	174	57.19	17	29.942	113	64.88	338	44.548	150	16.16	92	56.077	154	11.66	45
25.9	53.606	221	57.19	0	30.114	172	61.52	336	44.743	195	17.19	103	56.276	199	12.26	60
35.9	53.868	262	57.37	18	30.340	226	58.30	322	44.974	231	18.34	115	56.514	238	13.00	74
Mean Place	50.202		56.93		29.483		71.75		41.797		14.54		53.153		11.04	
Sec δ, Tan δ	1.133		−0.533		1.259		+0.920		1.017		−0.184		1.049		−0.317	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.07		−0.01		+0.04		+0.02		+0.07		0.00		+0.07		−0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	−0.2		−0.9		−0.2		−0.9		−0.1		−0.9		−0.1		−0.9	

FOR THE UPPER TRANSIT AT .

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	30 Ophiuchi. Mag. 5.0				ε Herculis. Mag. 3.9				d Herculis. Mag. 5.3				η Ophiuchi. Mag. 2.6			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 16 56		° ′ − 4 6		h m 16 57		° ′ +31 2		h m 16 58		° ′ +33 40		h m 17 5		° ′ −15 37	
	s		″		s		″		s		″		s		″	
Jan. 0.9	47.162		7.08		10.695		37.21		36.064		60.37		43.608		30.05	
10.9	47.392	230	8.47	139	10.913	218	34.35	286	36.283	219	57.43	294	43.902	294	30.79	74
20.9	47.650	258	9.84	137	11.169	256	31.72	263	36.540	257	54.73	270	44.198	296	31.57	78
30.8	47.927	277	11.13	129	11.452	283	29.40	232	36.826	286	52.36	237	44.484	286	32.37	80
Feb. 9.8	48.219	292	12.27	114	11.757	305	27.50	190	37.135	309	50.42	194	44.786	302	33.12	75
19.8	48.517	298	13.24	97	12.073	316	26.09	141	37.456	321	48.97	145	45.096	310	33.80	68
Mar. 1.8	48.816	299	13.97	73	12.393	320	25.20	89	37.783	327	48.08	89	45.408	312	34.37	57
11.7	49.112	296	14.45	48	12.712	319	24.88	32	38.108	325	47.75	33	45.717	309	34.82	45
21.7	49.399	287	14.65	20	13.020	308	25.11	23	38.424	316	48.01	26	46.019	302	35.10	28
31.7	49.674	275	14.60	5	13.316	296	25.90	79	38.725	301	48.83	82	46.311	292	35.24	14
Apr. 10.7	49.934	260	14.28	32	13.592	276	27.18	128	39.007	282	50.16	133	46.589	278	35.24	0
20.6	50.178	244	13.75	53	13.843	251	28.91	173	39.264	257	51.95	179	46.850	261	35.10	14
30.6	50.400	222	13.02	73	14.067	224	31.01	210	39.492	228	54.12	217	47.092	242	34.85	25
May 10.6	50.598	198	12.15	87	14.260	193	33.39	238	39.687	195	56.59	247	47.310	218	34.53	32
20.5	50.770	172	11.18	97	14.418	158	35.99	260	39.848	161	59.26	267	47.502	192	34.14	39
30.5	50.913	143	10.14	104	14.539	121	38.68	269	39.968	120	62.05	279	47.663	161	33.73	41
June 9.5	51.024	111	9.07	107	14.621	82	41.41	273	40.049	81	64.88	283	47.792	129	33.30	43
19.5	51.100	76	8.02	105	14.663	42	44.09	268	40.088	39	67.65	277	47.886	94	32.88	42
29.4	51.140	40	7.01	101	14.663	0	46.64	255	40.084	4	70.29	264	47.941	55	32.49	39
July 9.4	51.144	4	6.06	95	14.621	42	49.02	238	40.039	45	72.75	246	47.957	16	32.11	38
19.4	51.110	34	5.20	86	14.539	82	51.14	212	39.951	88	74.94	219	47.934	23	31.77	34
29.4	51.041	69	4.44	76	14.419	120	52.98	184	39.825	126	76.85	191	47.872	62	31.46	31
Aug. 8.3	50.940	101	3.79	65	14.265	154	54.49	151	39.663	162	78.41	156	47.776	96	31.17	29
18.3	50.810	130	3.24	55	14.083	182	55.63	114	39.472	191	79.59	118	47.649	127	30.91	26
28.3	50.658	152	2.80	44	13.877	206	56.39	76	39.257	215	80.37	78	47.497	152	30.65	26
Sept. 7.2	50.490	168	2.49	31	13.656	221	56.76	37	39.028	229	80.74	37	47.326	171	30.41	24
17.2	50.316	174	2.31	18	13.429	227	56.71	5	38.792	236	80.69	5	47.148	178	30.18	23
27.2	50.145	171	2.25	6	13.205	224	56.26	45	38.558	234	80.22	47	46.972	176	29.97	21
Oct. 7.2	49.987	158	2.33	8	12.995	210	55.39	87	38.338	220	79.31	91	46.808	164	29.78	19
17.1	49.849	138	2.57	24	12.807	188	54.11	128	38.140	198	77.98	133	46.664	144	29.63	15
27.1	49.743	106	2.96	39	12.651	156	52.44	167	37.975	165	76.25	173	46.552	112	29.54	9
Nov. 6.1	49.676	67	3.52	56	12.536	115	50.41	203	37.852	123	74.15	210	46.479	73	29.53	1
16.1	49.653	23	4.26	74	12.468	68	48.07	234	37.776	76	71.71	244	46.452	27	29.63	10
26.0	49.678	25	5.17	91	12.452	16	45.44	263	37.753	23	69.00	271	46.475	23	29.86	23
Dec. 6.0	49.752	74	6.24	107	12.490	38	42.61	283	37.785	32	66.08	292	46.548	73	30.20	34
16.0	49.873	121	7.46	122	12.581	91	39.64	297	37.872	87	63.02	306	46.671	123	30.68	48
25.9	50.039	166	8.78	132	12.726	145	36.63	301	38.014	142	59.92	310	46.840	169	31.27	59
35.9	50.244	205	10.17	139	12.915	189	33.67	296	38.202	188	56.89	303	47.050	210	31.98	71
Mean Place	47.325		7.65		11.394		41.50		36.841		64.85		43.825		32.47	
Sec δ, Tan δ	1.003		−0.072		1.167		+0.602		1.202		+0.667		1.038		−0.280	
$D_\psi a$, $D_\omega a$	+0.06		0.00		+0.05		+0.01		+0.04		+0.01		+0.07		0.00	
$D_\omega \delta$	−0.1		−1.0		−0.1		−1.0		−0.1		−1.0		−0.1		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	η Scorpii. Mag. 3.4				ζ Draconis. Mag. 3.2				α Herculis. Var. 3.1–3.9				δ Herculis. Mag. 3.2			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 17 6		° ′ −43 7		h m 17 8		° ′ +65 48		h m 17 10		° ′ +14 28		h m 17 11		° ′ +24 55	
	s		″		s		″		s		″		s		″	
Jan. 0.9	20.685		56.03		29.85		45.50		56.804		52.56		41.636		59.32	
10.9	20.986	301	55.25	78	30.13	28	42.10	340	57.010	206	50.31	225	41.840	204	56.64	268
20.9	21.326	340	54.67	58	30.50	37	39.01	309	57.247	237	48.20	211	42.078	238	54.15	249
30.9	21.696	370	54.31	36	30.94	44	36.32	269	57.510	263	46.28	192	42.345	267	51.94	221
Feb. 9.8	22.085	389	54.17	14	31.44	50	34.15	217	57.790	280	44.66	162	42.631	286	50.07	187
19.8	22.488	403	54.21	4	31.98	54	32.56	159	58.081	291	43.39	127	42.931	300	48.64	143
Mar. 1.8	22.893	405	54.43	22	32.55	57	31.64	92	58.376	295	42.53	86	43.239	308	47.68	96
11.7	23.297	404	54.80	37	33.13	58	31.39	25	58.671	295	42.09	44	43.544	305	47.26	42
21.7	23.691	394	55.32	52	33.70	57	31.84	45	58.961	290	42.09	0	43.845	301	47.35	9
31.7	24.073	382	55.97	65	34.25	55	32.92	108	59.240	279	42.53	44	44.135	290	47.96	61
Apr. 10.7	24.438	365	56.73	76	34.75	50	34.61	169	59.504	264	43.37	84	44.410	275	49.04	108
20.6	24.779	341	57.59	86	35.20	45	36.83	222	59.752	248	44.58	121	44.663	253	50.54	150
30.6	25.094	315	58.54	95	35.57	37	39.50	267	59.978	226	46.09	151	44.895	232	52.40	186
May 10.6	25.378	284	59.57	103	35.87	30	42.52	302	60.179	201	47.84	175	45.098	203	54.56	216
20.6	25.627	249	60.67	110	36.10	23	45.76	324	60.353	174	49.77	193	45.270	172	56.91	235
30.5	25.835	208	61.84	117	36.23	13	49.15	339	60.496	143	51.81	204	45.410	140	59.39	248
June 9.5	26.000	165	63.02	118	36.28	5	52.57	342	60.606	110	53.88	207	45.512	102	61.92	253
19.5	26.117	117	64.21	119	36.24	4	55.93	336	60.679	73	55.93	205	45.575	63	64.42	250
29.4	26.183	66	65.36	115	36.10	14	59.13	320	60.715	36	57.91	198	45.599	24	66.83	241
July 9.4	26.198	15	66.48	112	35.88	22	62.08	295	60.713	2	59.76	185	45.582	17	69.09	226
19.4	26.160	38	67.49	101	35.58	30	64.74	266	60.673	40	61.44	168	45.526	56	71.13	204
29.4	26.072	88	68.37	88	35.22	36	67.02	228	60.596	77	62.92	148	45.432	94	72.92	179
Aug. 8.3	25.938	134	69.07	70	34.79	43	68.89	187	60.485	111	64.16	124	45.301	131	74.41	149
18.3	25.764	174	69.58	51	34.31	48	70.28	139	60.345	140	65.16	100	45.142	159	75.59	118
28.3	25.557	207	69.85	27	33.79	52	71.19	91	60.181	164	65.87	71	44.957	185	76.43	84
Sept. 7.3	25.329	228	69.88	3	33.24	55	71.59	40	60.000	181	66.32	45	44.756	201	76.91	48
17.2	25.090	239	69.63	25	32.68	56	71.47	12	59.811	189	66.47	15	44.546	210	77.02	11
27.2	24.853	237	69.13	50	32.13	55	70.82	65	59.622	189	66.31	16	44.336	210	76.75	27
Oct. 7.2	24.632	221	68.37	76	31.59	54	69.65	117	59.442	180	65.86	45	44.136	200	76.10	65
17.1	24.439	193	67.41	96	31.10	49	67.98	167	59.284	158	65.11	75	43.956	180	75.08	102
27.1	24.287	152	66.25	116	30.65	45	65.83	215	59.153	131	64.05	106	43.806	150	73.71	137
Nov. 6.1	24.187	100	64.96	129	30.28	37	63.25	258	59.058	95	62.72	133	43.693	113	71.97	174
16.1	24.147	40	63.61	135	29.98	30	60.28	297	59.006	52	61.10	162	43.624	69	69.92	205
26.0	24.170	23	62.23	138	29.79	19	57.01	327	59.001	5	59.25	185	43.604	20	67.61	231
Dec. 6.0	24.261	91	60.91	132	29.69	10	53.51	350	59.045	44	57.19	206	43.634	30	65.07	254
16.0	24.415	154	59.69	122	29.69	0	49.88	363	59.137	92	54.99	220	43.716	82	62.38	269
26.0	24.629	214	58.61	108	29.80	11	46.24	364	59.276	139	52.71	228	43.848	132	59.62	276
35.9	24.897	268	57.71	90	30.01	21	42.71	353	59.456	180	50.42	229	44.023	175	56.88	274
Mean Place	20.905		62.07		32.982		51.38		57.199		54.00		42.222		61.90	
Sec δ, Tan δ	1.370		−0.937		2.441		+2.227		1.033		+0.258		1.103		+0.465	
$D_\psi\alpha$, $D_\omega\alpha$	+0.09		−0.01		0.00		+0.03		+0.05		0.00		+0.05		+0.01	
$D_\psi\delta$, $D_\omega\delta$	−0.1		−1.0		−0.1		−1.0		−0.1		−1.0		−0.1		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	π Herculis. Mag. 3.4 Right Ascension.		π Herculis. Declination.		θ Ophiuchi. Mag. 3.4 Right Ascension.		θ Ophiuchi. Declination.		ω Herculis. Mag. 5.4 Right Ascension.		ω Herculis. Declination.		β Arae. Mag. 2.8 Right Ascension.		β Arae. Declination.	
	h m 17 12		° ′ +36 53		h m 17 17		° ′ −24 55		h m 17 17		° ′ +32 33		h m 17 18		° ′ −55 27	
	s		″		s		″		s		″		s		″	
Jan. 0.9	12.580		55.11		1.838		8.00		36.863		72.90		33.267		10.13	
10.9	12.786	206	52.07	304	2.077	239	8.16	16	37.062	199	69.95	295	33.617	350	8.61	152
20.9	13.033	247	49.25	282	2.351	274	8.42	26	37.299	237	67.20	275	34.021	404	7.33	128
30.9	13.313	280	46.77	248	2.649	298	8.74	32	37.570	271	64.75	245	34.467	446	6.33	100
Feb. 9.8	13.621	308	44.70	207	2.963	314	9.11	37	37.864	294	62.70	205	34.944	477	5.62	71
19.8	13.945	324	43.14	156	3.288	325	9.49	38	38.176	312	61.12	158	35.442	498	5.20	42
Mar. 1.8	14.278	333	42.14	100	3.618	330	9.86	37	38.496	320	60.07	105	35.949	507	5.06	14
11.8	14.612	334	41.74	40	3.947	329	10.20	34	38.818	322	59.59	48	36.458	509	5.21	15
21.7	14.940	328	41.93	19	4.270	323	10.49	29	39.135	317	59.68	9	36.960	502	5.60	39
31.7	15.257	317	42.71	78	4.584	314	10.71	22	39.441	306	60.33	65	37.448	488	6.26	66
Apr. 10.7	15.554	297	44.02	131	4.885	301	10.90	19	39.731	290	61.51	118	37.916	468	7.14	88
20.6	15.828	274	45.82	180	5.171	286	11.03	13	40.001	270	63.16	165	38.357	441	8.23	109
30.6	16.073	245	48.03	221	5.437	266	11.13	10	40.244	243	65.21	205	38.766	409	9.51	128
May 10.6	16.285	212	50.57	254	5.680	243	11.21	8	40.457	213	67.57	236	39.134	368	10.95	144
20.6	16.460	175	53.33	276	5.895	215	11.28	7	40.637	180	70.17	260	39.457	323	12.56	161
30.5	16.596	136	56.24	291	6.080	185	11.35	7	40.781	144	72.91	274	39.728	271	14.26	170
June 9.5	16.690	94	59.19	295	6.229	149	11.44	9	40.884	103	75.71	280	39.942	214	16.04	178
19.5	16.739	49	62.11	292	6.340	111	11.55	11	40.945	61	78.49	278	40.093	151	17.85	181
29.5	16.743	4	64.93	282	6.411	71	11.67	12	40.963	18	81.17	268	40.178	85	19.65	180
July 9.4	16.701	42	67.54	261	6.439	28	11.80	13	40.937	26	83.67	250	40.197	19	21.38	173
19.4	16.615	86	69.92	238	6.424	15	11.92	12	40.869	68	85.96	229	40.146	51	22.98	160
29.4	16.488	127	71.99	207	6.368	56	12.03	11	40.760	109	87.95	199	40.031	115	24.42	144
Aug. 8.3	16.323	165	73.72	173	6.273	95	12.11	8	40.614	146	89.62	167	39.856	175	25.63	121
18.3	16.124	199	75.07	135	6.144	129	12.14	3	40.435	179	90.93	131	39.627	229	26.56	93
28.3	15.901	223	76.02	95	5.985	159	12.10	4	40.229	206	91.87	94	39.355	272	27.18	62
Sept. 7.3	15.659	242	76.53	51	5.808	177	11.99	11	40.006	223	92.40	53	39.053	302	27.44	26
17.2	15.408	251	76.60	7	5.619	189	11.80	19	39.773	233	92.51	11	38.735	318	27.33	11
27.2	15.158	250	76.22	38	5.429	190	11.52	28	39.539	234	92.19	32	38.416	319	26.86	47
Oct. 7.2	14.918	240	75.39	83	5.250	179	11.18	34	39.314	225	91.45	74	38.115	301	26.01	85
17.2	14.701	217	74.12	127	5.093	157	10.78	40	39.110	204	90.28	117	37.847	268	24.82	119
27.1	14.514	187	72.43	169	4.968	125	10.36	42	38.935	175	88.71	157	37.627	220	23.34	149
Nov. 6.1	14.368	146	70.34	209	4.883	85	9.93	43	38.799	136	86.77	194	37.469	158	21.60	174
16.1	14.270	98	67.90	244	4.845	38	9.53	40	38.708	91	84.48	229	37.385	84	19.71	189
26.0	14.225	45	65.16	274	4.859	14	9.20	33	38.667	41	81.88	260	37.380	5	17.71	200
Dec. 6.0	14.236	11	62.18	298	4.926	67	8.96	24	38.680	13	79.05	283	37.456	76	15.70	201
16.0	14.304	68	59.05	313	5.045	119	8.82	14	38.747	67	76.07	298	37.615	159	13.74	195
26.0	14.426	122	55.87	318	5.214	169	8.80	2	38.867	120	73.00	307	37.852	237	11.90	184
35.9	14.601	175	52.74	313	5.427	213	8.89	9	39.036	169	69.98	302	38.158	306	10.25	165
Mean Place	13.493		58.84		1.984		11.69		37.652		75.81		33.787		17.07	
Sec δ, Tan δ	1.250		+0.751		1.103		−0.465		1.187		+0.639		1.763		−1.453	
$D_\psi a$, $D_\omega a$	+0.04		+0.01		+0.07		−0.01		+0.04		+0.01		+0.10		−0.02	
$D_\psi \delta$, $D_\omega \delta$	−0.1		−1.0		−0.1		−1.0		−0.1		−1.0		−0.1		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	*b* Ophiuchi. Mag. 4.3				*σ* Ophiuchi. Mag. 4.4				*δ* Aræ. Mag. 3.8				*α* Aræ. Mag. 3.0			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 17 21		° ′ −24 6		h m 17 22		° ′ + 4 12		h m 17 23		° ′ −60 36		h m 17 25		° ′ −49 48	
	s		″		s		″		s		″		s		″	
Jan. 0.9	25.114	234	4.10	18	29.414	202	35.66	174	46.11	38	58.45	182	34.238	307	42.20	129
10.9	25.348	268	4.28	28	29.616	231	33.92	167	46.49	45	56.63	155	34.545	355	40.91	108
20.9	25.616	292	4.56	33	29.847	257	32.25	154	46.94	50	55.08	126	34.900	394	39.83	85
30.9	25.908	311	4.89	37	30.104	274	30.71	134	47.44	53	53.82	95	35.294	420	38.98	60
Feb. 9.8	26.219	321	5.26	37	30.378	285	29.37	107	47.97	57	52.87	61	35.714	438	38.38	37
19.8	26.540	327	5.63	36	30.663	291	28.30	77	48.54	58	52.26	29	36.152	450	38.01	13
Mar. 1.8	26.867	326	5.99	31	30.954	292	27.53	44	49.12	57	51.97	2	36.602	451	37.88	8
11.8	27.193	322	6.30	24	31.246	288	27.09	9	49.69	58	51.99	34	37.053	446	37.96	30
21.7	27.515	314	6.54	20	31.534	280	27.00	26	50.27	56	52.33	63	37.499	436	38.26	49
31.7	27.829	301	6.74	13	31.814	269	27.26	59	50.83	54	52.96	92	37.935	421	38.75	68
Apr. 10.7	28.130	286	6.87	8	32.083	253	27.85	87	51.37	51	53.88	117	38.356	397	39.43	85
20.6	28.416	266	6.95	4	32.336	235	28.72	114	51.88	47	55.05	139	38.753	372	40.28	101
30.6	28.682	245	6.99	1	32.571	213	29.86	132	52.35	43	56.44	161	39.125	338	41.29	116
May 10.6	28.927	217	7.00	0	32.784	189	31.18	147	52.78	36	58.05	177	39.463	299	42.45	129
20.6	29.144	188	7.00	1	32.973	159	32.65	156	53.14	31	59.82	191	39.762	255	43.74	138
30.5	29.332	153	7.01	3	33.132	127	34.21	159	53.45	25	61.73	200	40.017	205	45.12	147
June 9.5	29.485	115	7.04	4	33.259	94	35.80	158	53.70	17	63.73	205	40.222	151	46.59	150
19.5	29.600	74	7.08	6	33.353	56	37.38	152	53.87	10	65.78	205	40.373	92	48.09	150
29.5	29.674	32	7.14	8	33.409	18	38.90	143	53.97	2	67.83	198	40.465	33	49.59	146
July 9.4	29.706	10	7.22	9	33.427	20	40.33	131	53.99	6	69.81	185	40.498	27	51.05	138
19.4	29.696	52	7.31	8	33.407	58	41.64	114	53.93	14	71.66	167	40.471	86	52.43	123
29.4	29.644	91	7.39	6	33.349	92	42.78	98	53.79	21	73.33	142	40.385	142	53.66	107
Aug. 8.3	29.553	127	7.45	3	33.257	124	43.76	81	53.58	26	74.75	112	40.243	188	54.73	82
18.3	29.426	155	7.48	3	33.133	149	44.57	60	53.32	32	75.87	77	40.055	230	55.55	57
28.3	29.271	176	7.45	10	32.984	168	45.17	42	53.00	35	76.64	38	39.825	260	56.12	26
Sept. 7.3	29.095	188	7.35	17	32.816	178	45.59	20	52.65	38	77.02	1	39.565	275	56.38	5
17.2	28.907	189	7.18	24	32.638	180	45.79	0	52.27	37	77.01	45	39.290	277	56.33	38
27.2	28.718	180	6.94	31	32.458	172	45.79	22	51.90	36	76.56	86	39.013	264	55.95	70
Oct. 7.2	28.538	158	6.63	35	32.286	153	45.57	43	51.54	32	75.70	124	38.749	237	55.25	99
17.2	28.380	128	6.28	38	32.133	127	45.14	66	51.22	27	74.46	159	38.512	195	54.26	126
27.1	28.252	88	5.90	38	32.006	93	44.48	87	50.95	21	72.87	187	38.317	140	53.00	146
Nov. 6.1	28.164	41	5.52	34	31.913	50	43.61	110	50.74	10	71.00	209	38.177	78	51.54	162
16.1	28.123	9	5.18	29	31.863	5	42.51	129	50.64	3	68.91	222	38.099	7	49.92	170
26.0	28.132	62	4.89	20	31.858	43	41.22	147	50.61	6	66.69	227	38.092	64	48.22	172
Dec. 6.0	28.194	114	4.69	10	31.901	90	39.75	163	50.67	16	64.42	224	38.156	138	46.50	166
16.0	28.308	163	4.59	2	31.991	135	38.12	171	50.83	25	62.18	213	38.294	206	44.84	156
26.0	28.471	208	4.61	12	32.126	176	36.41	175	51.08	33	60.05	195	38.500	268	43.28	141
35.9	28.679		4.73		32.302		34.66		51.41		58.10		38.768		41.87	
Mean Place	25.270		7.68		29.704		35.37		46.851		65.61		34.640		48.39	
Sec δ, Tan δ	1.096		−0.447		1.003		+0.074		2.038		−1.776		1.550		−1.184	
$D_\psi a$, $D_\omega a$	+0.07		−0.01		+0.06		0.00		+0.11		−0.02		+0.09		−0.01	
$D_\psi \delta$, $D_\omega \delta$	−0.1		−1.0		−0.1		−1.0		−0.1		−1.0		−0.1		−1.0	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Serpentis. Mag. 3.6				ι Herculis. Mag. 3.8				ω Draconis. Mag. 4.9				η Pavonis. Mag. 3.6			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 17 32		° ′ −15 20		h m 17 37		° ′ +46 2		h m 17 37		° ′ +68 47		h m 17 37		° ′ −64 40	
	s		″		s		″		s		″		s		″	
Jan. 1.0	56.621	210	52.20	63	9.371	180	53.66	329	21.62	22	40.91	346	45.64	40	66.30	212
10.9	56.831	242	52.83	66	9.551	233	50.37	307	21.84	34	37.45	325	46.04	47	64.18	188
20.9	57.073	269	53.49	67	9.784	278	47.30	276	22.18	42	34.20	288	46.51	54	62.30	157
30.9	57.342	286	54.16	62	10.062	315	44.54	233	22.60	51	31.32	243	47.05	60	60.73	126
Feb. 9.8	57.628	298	54.78	54	10.377	342	42.21	182	23.11	57	28.89	187	47.65	62	59.47	92
19.8	57.926	307	55.32	42	10.719	360	40.39	125	23.68	62	27.02	126	48.27	65	58.55	56
Mar. 1.8	58.233	307	55.74	28	11.079	369	39.14	61	24.30	64	25.76	59	48.92	66	57.99	22
11.8	58.540	304	56.02	15	11.448	369	38.53	3	24.94	64	25.17	10	49.58	66	57.77	14
21.7	58.844	299	56.17	1	11.817	362	38.56	66	25.58	63	25.27	75	50.24	64	57.91	45
31.7	59.143	290	56.16	16	12.179	344	39.22	125	26.21	59	26.02	140	50.88	62	58.36	77
Apr. 10.7	59.433	276	56.00	29	12.523	321	40.47	180	26.80	55	27.42	196	51.50	58	59.13	107
20.7	59.709	259	55.71	39	12.844	291	42.27	227	27.35	48	29.38	246	52.08	56	60.20	135
30.6	59.968	239	55.32	46	13.135	254	44.54	265	27.83	39	31.84	285	52.64	50	61.55	160
May 10.6	60.207	214	54.86	52	13.389	213	47.19	293	28.22	30	34.69	316	53.14	44	63.15	180
20.6	60.421	187	54.34	54	13.602	167	50.12	313	28.52	21	37.85	335	53.58	38	64.95	198
30.5	60.608	153	53.80	52	13.769	117	53.25	323	28.73	11	41.20	346	53.96	30	66.93	213
June 9.5	60.761	118	53.28	51	13.886	66	56.48	323	28.84	1	44.66	346	54.26	22	69.06	219
19.5	60.879	80	52.77	47	13.952	12	59.71	315	28.85	9	48.12	336	54.48	12	71.25	221
29.5	60.959	39	52.30	42	13.964	41	62.86	298	28.76	21	51.48	319	54.60	3	73.46	218
July 9.4	60.998	0	51.88	37	13.923	94	65.84	275	28.55	29	54.67	293	54.63	5	75.64	206
19.4	60.998	43	51.51	32	13.829	144	68.59	245	28.26	38	57.60	260	54.58	14	77.70	190
29.4	60.955	80	51.19	27	13.685	188	71.04	210	27.88	46	60.20	222	54.44	22	79.60	165
Aug. 8.4	60.875	115	50.92	22	13.497	229	73.14	170	27.42	52	62.42	179	54.22	30	81.25	137
18.3	60.760	143	50.70	20	13.268	262	74.84	127	26.90	58	64.21	133	53.92	37	82.62	100
28.3	60.617	166	50.50	18	13.006	286	76.11	81	26.32	62	65.54	83	53.55	40	83.62	59
Sept. 7.3	60.451	178	50.32	16	12.720	301	76.92	34	25.70	64	66.37	32	53.15	43	84.21	16
17.2	60.273	181	50.16	15	12.419	305	77.26	16	25.06	65	66.69	21	52.72	44	84.37	29
27.2	60.092	174	50.01	12	12.114	298	77.10	64	24.41	63	66.48	74	52.28	43	84.08	74
Oct. 7.2	59.918	156	49.89	8	11.816	280	76.46	113	23.78	60	65.74	126	51.85	39	83.34	118
17.2	59.762	128	49.81	4	11.536	249	75.33	161	23.18	56	64.48	176	51.46	33	82.16	156
27.1	59.634	95	49.77	3	11.287	208	73.72	204	22.62	49	62.72	223	51.13	26	80.60	190
Nov. 6.1	59.539	50	49.80	11	11.079	161	71.68	246	22.13	41	60.49	267	50.87	17	78.70	218
16.1	59.489	3	49.91	21	10.918	104	69.22	281	21.72	31	57.82	303	50.70	8	76.52	235
26.1	59.486	46	50.12	31	10.814	43	66.41	309	21.41	19	54.79	331	50.62	4	74.17	245
Dec. 6.0	59.532	96	50.43	42	10.771	20	63.32	328	21.22	9	51.48	351	50.66	15	71.72	247
16.0	59.628	141	50.85	52	10.791	82	60.04	338	21.13	3	47.97	360	50.81	24	69.25	239
26.0	59.769	184	51.37	60	10.873	144	56.66	337	21.16	15	44.37	355	51.05	34	66.86	224
35.9	59.953		51.97		11.017		53.29		21.31		40.82		51.39		64.62	
Mean Place	56.808		54.85		10.714		55.83		25.432		43.71		46.683		73.12	
Sec δ, Tan δ	1.037		−0.274		1.441		+1.037		2.765		+2.578		2.339		−2.114	
$D_\psi\alpha$, $D_\omega\alpha$	+0.07		0.00		+0.03		+0.01		−0.01		+0.02		+0.11		−0.01	
$D_\psi\delta$, $D_\omega\delta$	0.0		−1.0		0.0		−1.0		0.0		−1.0		0.0		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Ophiuchi. Mag. 2.9 Right Ascension.		Declination.		ι^1 Scorpii. Mag. 3.1 Right Ascension.		Declination.		μ Herculis. Mag. 3.5 Right Ascension.		Declination.		ψ Draconis. Mag. 4.9 Right Ascension.		Declination.	
	h m 17 39		° ′ + 4 35		h m 17 41		° ′ −40 5		h m 17 43		° ′ +27 45		h m 17 43		° ′ +72 11	
	s		″		s		″		s		″		s		″	
Jan. 1.0	27.917		61.41		54.848		44.04		16.565		61.34		17.78		18.10	
10.9	28.102	185	59.69	172	55.098	250	43.16	88	16.736	171	58.56	278	18.00	22	14.62	[illegible]
20.9	28.320	218	58.05	164	55.390	292	42.43	73	16.946	210	55.93	263	18.35	35	11.35	[illegible]
30.9	28.564	244	56.53	152	55.714	324	41.86	57	17.188	242	53.54	239	18.82	47	8.42	[illegible]
Feb. 9.9	28.829	265	55.20	133	56.065	351	41.43	43	17.458	270	51.49	205	19.39	57	5.94	[illegible]
19.8	29.106	277	54.14	106	56.433	368	41.15	28	17.745	287	49.87	162	20.04	65	4.00	[illegible]
Mar. 1.8	29.393	287	53.38	76	56.812	379	41.00	15	18.047	302	48.72	115	20.75	71	2.67	[illegible]
11.8	29.683	290	52.94	44	57.195	383	40.97	3	18.354	307	48.10	62	21.50	75	1.99	[illegible]
21.7	29.972	289	52.87	7	57.577	382	41.05	8	18.662	308	48.02	8	22.25	75	2.01	[illegible]
31.7	30.255	283	53.16	29	57.955	378	41.25	20	18.964	302	48.50	48	22.98	73	2.68	[illegible]
Apr. 10.7	30.530	275	53.77	61	58.321	366	41.54	29	19.256	292	49.47	97	23.68	70	3.98	[illegible]
20.7	30.792	262	54.68	91	58.671	350	41.93	39	19.533	277	50.90	143	24.31	63	5.86	[illegible]
30.6	31.038	246	55.85	117	59.002	331	42.42	49	19.789	256	52.74	184	24.87	56	8.25	[illegible]
May 10.6	31.265	227	57.23	138	59.308	306	43.01	59	20.021	232	54.92	218	25.34	47	11.04	[illegible]
20.6	31.466	201	58.75	152	59.584	276	43.71	70	20.222	201	57.34	242	25.70	36	14.15	[illegible]
30.6	31.640	174	60.38	163	59.825	241	44.48	77	20.391	169	59.94	260	25.94	24	17.46	[illegible]
June 9.5	31.783	143	62.04	166	60.025	200	45.34	86	20.523	132	62.62	268	26.07	13	20.89	[illegible]
19.5	31.891	108	63.69	165	60.182	157	46.25	91	20.616	93	65.31	269	26.07	0	24.34	[illegible]
29.5	31.962	71	65.28	159	60.288	106	47.19	94	20.667	51	67.93	262	25.95	12	27.70	[illegible]
July 9.4	31.993	31	66.79	151	60.344	56	48.16	97	20.674	7	70.43	250	25.72	23	30.90	[illegible]
19.4	31.986	7	68.17	138	60.347	3	49.09	93	20.638	36	72.73	230	25.36	36	33.94	[illegible]
29.4	31.940	46	69.38	121	60.298	49	49.96	87	20.560	78	74.79	206	24.91	45	36.47	[illegible]
Aug. 8.4	31.857	83	70.44	106	60.201	97	50.73	77	20.442	118	76.56	177	24.36	55	38.74	[illegible]
18.3	31.741	116	71.31	87	60.061	140	51.36	63	20.290	152	78.02	146	23.76	60	40.58	184
28.3	31.597	144	71.98	67	59.881	180	51.82	46	20.109	181	79.13	111	23.05	71	41.97	139
Sept. 7.3	31.432	165	72.45	47	59.672	209	52.07	25	19.905	204	79.86	73	22.30	75	42.86	[illegible]
17.3	31.254	178	72.71	26	59.447	225	52.12	5	19.687	218	80.21	35	21.53	77	43.25	39
27.2	31.072	182	72.76	5	59.216	231	51.92	20	19.465	222	80.17	4	20.75	78	43.11	14
Oct. 7.2	30.895	177	72.58	18	58.992	224	51.50	42	19.248	217	79.73	44	19.99	76	42.45	66
17.2	30.735	160	72.19	39	58.788	204	50.85	65	19.046	202	78.88	85	19.27	72	41.26	119
27.1	30.598	137	71.57	62	58.617	171	50.02	83	18.869	177	77.64	124	18.59	68	39.57	[illegible]
Nov. 6.1	30.494	104	70.74	83	58.489	128	49.03	99	18.724	145	76.03	161	17.98	61	37.40	[illegible]
16.1	30.430	64	69.69	105	58.412	77	47.93	110	18.621	103	74.06	197	17.47	51	34.80	[illegible]
26.1	30.410	20	68.42	127	58.394	18	46.75	118	18.565	56	71.80	226	17.06	41	31.81	[illegible]
Dec. 6.0	30.436	26	66.99	143	58.437	43	45.57	118	18.558	7	69.28	252	16.79	27	28.54	[illegible]
16.0	30.509	73	65.40	159	58.542	105	44.43	114	18.602	44	66.57	271	16.65	14	25.05	[illegible]
26.0	30.628	119	63.71	169	58.705	163	43.38	105	18.697	95	63.75	282	16.64	1	21.47	[illegible]
36.0	30.787	159	61.99	172	58.921	216	42.43	95	18.839	142	60.92	283	16.77	13	17.90	[illegible]
Mean Place	28.230		60.53		55.142		48.91		17.267		62.00		22.511		20.25	
Sec δ, Tan δ	1.003		+0.080		1.307		−0.842		1.130		+0.527		3.269		+3.113	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		0.00		+0.08		0.00		+0.05		0.00		−0.02		+0.01	
$D_\psi\delta$, $D_\omega\delta$	0.0		−1.0		0.0		−1.0		0.0		−1.0		0.0		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Ophiuchi. Mag. 3.7				ξ Draconis. Mag. 3.9				89 Herculis. Mag. 5.5				35 Draconis. Mag. 5.0			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 17 43		° ′ + 2 44		h m 17 52		° ′ +56 52		h m 17 52		° ′ +26 3		h m 17 52		° ′ +76 58	
	s		″		s		″		s		″		s		″	
Jan. 1.0	49.520		13.59		5.655		64.97		8.481		43.44		57.56		26.97	
10.9	49.702	182	12.00	159	5.819	164	61.52	345	8.644	163	40.75	269	57.78	22	23.53	344
20.9	49.918	216	10.44	156	6.056	237	58.24	328	8.846	202	38.20	255	58.18	40	20.27	326
30.9	50.159	241	9.00	144	6.355	299	55.28	296	9.080	234	35.87	233	58.75	57	17.32	295
Feb. 9.9	50.422	263	7.75	125	6.708	353	52.74	254	9.342	262	33.86	201	59.46	71	14.80	252
19.8	50.698	276	6.73	102	7.103	395	50.72	202	9.623	281	32.25	161	60.29	83	12.79	201
Mar. 1.8	50.984	286	6.00	73	7.528	425	49.31	141	9.918	295	31.11	114	61.21	92	11.38	141
11.8	51.273	289	5.58	42	7.972	444	48.52	79	10.222	304	30.47	64	62.19	98	10.61	77
21.7	51.562	289	5.50	8	8.422	450	48.41	11	10.527	305	30.36	11	63.19	100	10.51	10
31.7	51.846	284	5.76	— 26	8.865	443	48.97	— 56	10.828	301	30.78	— 42	64.17	98	11.08	— 57
Apr. 10.7	52.123	277	6.33	57	9.293	428	50.15	118	11.121	293	31.71	93	65.11	94	12.27	119
20.7	52.388	265	7.18	85	9.691	398	51.92	177	11.400	279	33.10	139	65.98	87	14.04	177
30.6	52.636	248	8.29	111	10.052	361	54.20	228	11.660	260	34.90	180	66.74	76	16.32	228
May 10.6	52.866	230	9.58	129	10.367	315	56.91	271	11.898	238	37.02	212	67.36	62	19.03	271
20.6	53.071	205	11.03	145	10.628	261	59.95	304	12.108	210	39.39	237	67.85	49	22.09	306
30.6	53.251	180	12.56	153	10.831	203	63.22	327	12.286	178	41.96	257	68.19	34	25.34	325
June 9.5	53.399	148	14.13	157	10.968	137	66.61	339	12.430	144	44.61	265	68.35	16	28.74	340
19.5	53.512	113	15.69	156	11.041	73	70.05	344	12.534	104	47.28	267	68.36	1	32.18	344
29.5	53.588	76	17.20	151	11.044	3	73.43	338	12.596	62	49.89	261	68.20	— 16	35.56	338
July 9.4	53.626	38	18.62	142	10.978	— 66	76.66	323	12.615	19	52.38	249	67.87	33	38.79	323
19.4	53.625	— 1	19.92	130	10.847	131	79.67	301	12.591	— 24	54.70	232	67.39	48	41.79	300
29.4	53.584	41	21.06	114	10.652	195	82.38	271	12.525	66	56.78	208	66.77	62	44.50	271
Aug. 8.4	53.505	79	22.06	100	10.399	253	84.75	237	12.419	106	58.60	182	66.01	76	46.87	237
18.3	53.393	112	22.88	82	10.095	304	86.71	196	12.278	141	60.10	150	65.16	85	48.83	196
28.3	53.252	141	23.50	62	9.749	346	88.23	152	12.105	173	61.26	116	64.21	95	50.35	152
Sept. 7.3	53.089	163	23.95	45	9.371	378	89.27	104	11.910	195	62.06	80	63.20	101	51.40	105
17.3	52.913	176	24.20	25	8.972	399	89.81	54	11.698	212	62.51	45	62.14	106	51.94	54
27.2	52.732	181	24.26	6	8.564	408	89.82	1	11.481	217	62.56	5	61.06	108	51.97	3
Oct. 7.2	52.556	176	24.11	— 15	8.163	401	89.32	— 50	11.268	213	62.22	— 34	60.00	106	51.46	— 51
17.2	52.395	161	23.77	34	7.778	385	88.30	102	11.067	201	61.49	73	58.97	103	50.44	102
27.1	52.257	138	23.22	55	7.425	353	86.77	153	10.889	178	60.38	111	58.00	97	48.92	152
Nov. 6.1	52.152	105	22.45	77	7.117	308	84.76	201	10.744	145	58.90	148	57.12	88	46.92	200
16.1	52.086	66	21.49	96	6.864	253	82.30	246	10.639	105	57.08	182	56.37	75	44.47	245
26.1	52.063	23	20.33	116	6.677	187	79.46	284	10.579	60	54.95	213	55.75	62	41.64	283
Dec. 6.0	52.087	— 24	19.01	132	6.561	116	76.30	316	10.567	12	52.57	238	55.30	45	38.49	315
16.0	52.158	71	17.54	147	6.523	38	72.91	339	10.605	— 38	49.98	259	55.03	27	35.12	337
26.0	52.274	116	15.97	157	6.563	— 40	69.38	353	10.692	87	47.28	270	54.94	9	31.61	351
36.0	52.430	156	14.34	163	6.681	118	65.86	352	10.826	134	44.55	273	55.04	— 10	28.10	351
Mean Place	49.827		12.40		7.760		66.02		9.152		43.38		64.420		27.99	
Sec δ, Tan δ	1.001		+0.048		1.830		+1.533		1.113		+0.489		4.437		+4.323	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.06		0.00		+0.02		0.00		+0.05		0.00		−0.05		+0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	0.0		−1.0		0.0		−1.0		0.0		−1.0		0.0		−1.0	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

ngton Time.	67 Ophiuchi. Mag. 3.9 Right Ascension.		67 Ophiuchi. Declination.		θ Aræ. Mag. 3.9 Right Ascension.		θ Aræ. Declination.	
	h m 17 56		° ′ + 2 55		h m 18 0		° ′ −50 5	
	s		″		s		″	
1.0	34.985	171	65.64	158	18.989	260	49.88	155
10.9	35.156	205	64.06	154	19.249	313	48.33	140
20.9	35.361	232	62.52	142	19.562	357	46.93	121
30.9	35.593	254	61.10	123	19.919	392	45.72	102
9.9	35.847	270	59.87	101	20.311	417	44.70	81
19.8	36.117	281	58.86	72	20.728	435	43.89	59
1.8	36.398	287	58.14	40	21.163	447	43.30	38
11.8	36.685	289	57.74	8	21.610	449	42.92	16
21.8	36.974	287	57.66	28	22.059	445	42.76	4
31.7	37.261	280	57.94	60	22.504	438	42.80	25
10.7	37.541	271	58.54	87	22.942	423	43.05	44
20.7	37.812	256	59.41	114	23.365	401	43.49	64
30.6	38.068	239	60.55	133	23.766	375	44.13	82
10.6	38.307	216	61.88	148	24.141	340	44.95	99
20.6	38.523	190	63.36	158	24.481	300	45.94	116
30.6	38.713	159	64.94	161	24.781	252	47.10	128
9.5	38.872	124	66.55	161	25.033	200	48.38	139
19.5	38.996	88	68.16	156	25.233	141	49.77	146
29.5	39.084	49	69.72	147	25.374	81	51.23	148
9.5	39.133	8	71.19	134	25.455	18	52.71	146
19.4	39.141	32	72.53	120	25.473	46	54.17	140
29.4	39.109	71	73.73	104	25.427	105	55.57	127
8.4	39.038	106	74.77	86	25.322	161	56.84	108
18.3	38.932	134	75.63	67	25.161	209	57.92	86
28.3	38.798	160	76.30	48	24.952	246	58.78	59
7.3	38.638	174	76.78	28	24.706	271	59.37	30
17.3	38.464	181	77.06	10	24.435	282	59.67	2
27.2	38.283	179	77.16	11	24.153	279	59.65	36
7.2	38.104	165	77.05	33	23.874	260	59.29	69
17.2	37.939	144	76.72	52	23.614	227	58.60	98
27.2	37.795	113	76.20	74	23.387	180	57.62	125
6.1	37.682	76	75.46	93	23.207	122	56.37	146
16.1	37.606	33	74.53	113	23.085	56	54.91	163
26.1	37.573	13	73.40	130	23.029	13	53.28	171
6.0	37.586	58	72.10	144	23.042	86	51.57	173
16.0	37.644	103	70.66	154	23.128	155	49.84	171
26.0	37.747	144	69.12	159	23.283	219	48.13	161
36.0	37.891		67.53		23.502		46.52	
lace	35.312		64.02		19.506		54.85	
an δ	1.001		+0.051		1.559		−1.196	
,α	*+0.06*		*0.00*		*+0.09*		0.00	
;	*0.0*		*−1.0*		*0.0*		−1.0	

ngton Time.	γ Sagittarii. Mag. 3.1 Right Ascension.		γ Sagittarii. Declination.		70 Ophiuchi. Mag. 4.1 Right Ascension.		70 Ophiuchi. Declination.	
	h m 18 0		° ′ −30 25		h m 18 1		° ′ + 2 30	
	s		″		s		″	
1.0	35.930	207	31.07	40	21.296	168	63.67	157
10.9	36.137	245	30.67	33	21.464	201	62.10	153
20.9	36.382	276	30.34	24	21.665	229	60.57	143
30.9	36.658	302	30.10	19	21.894	252	59.14	124
9.9	36.960	319	29.91	14	22.146	268	57.90	102
19.8	37.279	331	29.77	12	22.414	280	56.88	73
1.8	37.610	338	29.65	9	22.694	286	56.15	43
11.8	37.948	341	29.56	9	22.980	289	55.72	9
21.8	38.289	339	29.47	7	23.269	288	55.63	24
31.7	38.628	333	29.40	6	23.557	282	55.87	55
10.7	38.961	323	29.34	5	23.839	272	56.42	85
20.7	39.284	308	29.29	1	24.111	259	57.27	110
30.6	39.592	289	29.28	3	24.370	242	58.37	129
10.6	39.881	264	29.31	9	24.612	220	59.66	144
20.6	40.145	235	29.40	15	24.832	195	61.10	154
30.6	40.380	201	29.55	24	25.027	163	62.64	158
9.5	40.581	161	29.79	29	25.190	130	64.22	157
19.5	40.742	118	30.08	35	25.320	94	65.79	152
29.5	40.860	72	30.43	41	25.414	53	67.31	144
9.5	40.932	25	30.84	43	25.467	12	68.75	131
19.4	40.957	22	31.27	44	25.479	27	70.06	116
29.4	40.935	69	31.71	43	25.452	66	71.22	100
8.4	40.866	111	32.14	38	25.386	102	72.22	83
18.3	40.755	147	32.52	30	25.284	131	73.05	64
28.3	40.608	176	32.82	19	25.153	157	73.69	46
7.3	40.432	194	33.01	9	24.996	172	74.15	25
17.3	40.238	204	33.10	5	24.824	181	74.40	7
27.2	40.034	201	33.05	19	24.643	179	74.47	13
7.2	39.833	187	32.86	31	24.464	166	74.34	34
17.2	39.646	161	32.55	42	24.298	146	74.00	53
27.2	39.485	124	32.13	52	24.152	115	73.47	74
6.1	39.361	81	31.61	58	24.037	78	72.73	93
16.1	39.280	31	31.03	61	23.959	36	71.80	112
26.1	39.249	22	30.42	61	23.923	8	70.68	129
6.0	39.271	76	29.81	57	23.931	55	69.39	143
16.0	39.347	127	29.24	52	23.986	100	67.96	153
26.0	39.474	176	28.72	44	24.086	141	66.43	158
36.0	39.650		28.28		24.227		64.85	
lace	36.186		34.86		21.623		61.86	
an δ	1.160		−0.587		1.001		+0.044	
,α	+0.08		0.00		+0.06		0.00	
;	0.0		−1.0		0.0		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	72 Ophiuchi. Mag. 3.7 Right Ascension.		72 Ophiuchi. Declination.		o Herculis. Mag. 3.8 Right Ascension.		o Herculis. Declination.	
	h m 18 3		° ′ + 9 32		h m 18 4		° ′ +28 44	
	s		″		s		″	
Jan. 1.0	30.132	160	66.72	191	22.196	149	62.51	278
11.0	30.292	194	64.81	185	22.345	189	59.73	265
20.9	30.486	224	62.96	169	22.534	226	57.08	244
30.9	30.710	247	61.27	149	22.760	255	54.64	212
Feb. 9.9	30.957	266	59.78	120	23.015	277	52.52	171
19.8	31.223	278	58.58	86	23.292	294	50.81	125
Mar. 1.8	31.501	285	57.72	48	23.586	306	49.56	72
11.8	31.786	288	57.24	10	23.892	309	48.84	18
21.8	32.074	288	57.14	31	24.201	308	48.66	37
31.7	32.362	282	57.45	69	24.509	301	49.03	89
Apr. 10.7	32.644	273	58.14	104	24.810	290	49.92	138
20.7	32.917	258	59.18	133	25.100	273	51.30	181
30.7	33.175	241	60.51	159	25.373	249	53.11	217
May 10.6	33.416	218	62.10	176	25.622	222	55.28	244
20.6	33.634	193	63.86	191	25.844	191	57.72	265
30.6	33.827	160	65.77	196	26.035	153	60.37	276
June 9.5	33.987	126	67.73	197	26.188	114	63.13	279
19.5	34.113	89	69.70	193	26.302	72	65.92	276
29.5	34.202	49	71.63	182	26.374	27	68.68	263
July 9.5	34.251	8	73.45	168	26.401	17	71.31	248
19.4	34.259	34	75.13	153	26.384	62	73.79	225
29.4	34.225	72	76.66	133	26.322	103	76.04	196
Aug. 8.4	34.153	107	77.99	110	26.219	140	78.00	166
18.4	34.046	138	79.09	87	26.079	174	79.66	131
28.3	33.908	163	79.96	63	25.905	199	80.97	95
Sept. 7.3	33.745	179	80.59	38	25.706	217	81.92	56
17.3	33.566	187	80.97	11	25.489	224	82.48	16
27.2	33.379	185	81.08	14	25.265	224	82.64	26
Oct. 7.2	33.194	174	80.94	40	25.041	211	82.38	66
17.2	33.020	152	80.54	68	24.830	190	81.72	106
27.2	32.868	124	79.86	92	24.640	160	80.66	146
Nov. 6.1	32.744	86	78.94	118	24.480	121	79.20	181
16.1	32.658	46	77.76	140	24.359	77	77.39	215
26.1	32.612	0	76.36	162	24.282	29	75.24	242
Dec. 6.1	32.612	45	74.74	177	24.253	21	72.82	264
16.0	32.657	91	72.97	188	24.274	71	70.18	277
26.0	32.748	133	71.09	193	24.345	119	67.41	281
36.0	32.881		69.16		24.464		64.60	
Mean Place	30.534		65.20		22.938		61.71	
Sec δ, Tan δ	1.014		+0.168		1.141		+0.549	
$D_\psi \alpha$, $D_\omega \alpha$	+0.06		0.00		+0.05		0.00	
$D_\psi \delta$, $D_\omega \delta$	0.0		−1.0		0.0		−1.0	

Washington Mean Time.	μ Sagittarii. Mag. 4.0 Right Ascension.		μ Sagittarii. Declination.		η Sagittarii. Mag. 3.2 Right Ascension.		η Sagittarii. Declination.	
	h m 18 8		° ′ −21 4		h m 18 12		° ′ −36 47	
	s		″		s		″	
Jan. 1.0	54.878	183	49.12	12	8.494	206	9.42	85
11.0	55.061	219	49.24	16	8.700	248	8.57	76
20.9	55.280	250	49.40	17	8.948	283	7.81	66
30.9	55.530	273	49.57	17	9.231	313	7.15	57
Feb. 9.9	55.803	290	49.74	12	9.544	333	6.58	48
19.8	56.093	304	49.86	7	9.877	350	6.10	39
Mar. 1.8	56.397	311	49.93	1	10.227	358	5.71	31
11.8	56.708	314	49.92	11	10.585	364	5.40	23
21.8	57.022	315	49.81	20	10.949	363	5.17	16
31.7	57.337	310	49.61	27	11.312	360	5.01	8
Apr. 10.7	57.647	301	49.34	35	11.672	349	4.93	0
20.7	57.948	290	48.99	39	12.021	336	4.93	9
30.7	58.238	274	48.60	42	12.357	317	5.02	21
May 10.6	58.512	251	48.18	41	12.674	291	5.23	30
20.6	58.763	224	47.77	40	12.965	260	5.53	40
30.6	58.987	194	47.37	35	13.225	225	5.93	51
June 9.5	59.181	158	47.02	29	13.450	184	6.44	61
19.5	59.339	118	46.73	21	13.634	137	7.05	70
29.5	59.457	76	46.52	16	13.771	90	7.75	74
July 9.5	59.533	31	46.36	10	13.861	37	8.49	78
19.4	59.564	13	46.26	3	13.898	15	9.27	78
29.4	59.551	57	46.23	0	13.883	65	10.05	74
Aug. 8.4	59.494	95	46.23	3	13.818	112	10.79	66
18.4	59.399	131	46.26	4	13.706	153	11.45	57
28.3	59.268	159	46.30	3	13.553	185	12.02	41
Sept. 7.3	59.109	178	46.33	0	13.368	209	12.43	24
17.3	58.931	187	46.33	3	13.159	220	12.67	5
27.2	58.744	187	46.30	7	12.939	221	12.72	16
Oct. 7.2	58.557	174	46.23	11	12.718	206	12.56	35
17.2	58.383	152	46.12	14	12.512	183	12.21	53
27.2	58.231	120	45.98	14	12.329	145	11.68	71
Nov. 6.1	58.111	80	45.84	14	12.184	101	10.97	83
16.1	58.031	35	45.70	12	12.083	47	10.14	91
26.1	57.996	13	45.58	7	12.036	7	9.23	97
Dec. 6.1	58.009	63	45.51	1	12.043	65	8.26	97
16.0	58.072	110	45.50	4	12.108	121	7.29	95
26.0	58.182	155	45.54	11	12.229	173	6.34	88
36.0	58.337		45.65		12.402		5.46	
Mean Place	55.117		52.30		8.815		13.33	
Sec δ, Tan δ	1.072		−0.385		1.249		−0.748	
$D_\psi \alpha$, $D_\omega \alpha$	+0.07		0.00		+0.08		0.00	
$D_\psi \delta$, $D_\omega \delta$	0.0		−1.0		0.0		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ε Sagittarii. Mag. 2.0 Right Ascension.		Declination.		109 Herculis. Mag. 3.9 Right Ascension.		Declination.	
	h m 18 18		° ′ −34 25		h m 18 20		° ′ +21 43	
	s		″		s		″	
Jan. 1.0	47.407		22.88		14.160		56.59	
11.0	47.601	194	22.14	74	14.295	135	54.12	247
20.9	47.835	234	21.48	66	14.471	176	51.73	239
30.9	48.106	271	20.88	60	14.680	209	49.53	220
Feb. 9.9	48.405	299	20.36	52	14.917	237	47.58	195
19.9	48.725	320	19.91	45	15.177	260	45.99	159
Mar. 1.8	49.061	336	19.52	39	15.455	278	44.81	118
11.8	49.407	346	19.18	34	15.744	289	44.10	71
21.8	49.761	354	18.88	30	16.040	296	43.87	23
31.7	50.115	354	18.65	23	16.338	298	44.15	28
Apr. 10.7	50.466	351	18.47	18	16.633	295	44.91	76
20.7	50.809	343	18.35	12	16.920	287	46.11	120
30.7	51.141	332	18.31	4	17.194	274	47.72	161
May 10.6	51.454	313	18.35	4	17.449	255	49.65	193
20.6	51.744	290	18.49	14	17.682	233	51.85	220
30.6	52.005	261	18.74	25	17.885	203	54.24	239
June 9.6	52.231	226	19.09	35	18.056	171	56.75	251
19.5	52.417	186	19.53	44	18.191	135	59.29	254
29.5	52.559	142	20.07	54	18.286	95	61.81	252
July 9.5	52.653	94	20.67	60	18.339	53	64.24	243
19.4	52.696	43	21.32	65	18.347	8	66.52	228
29.4	52.689	7	21.99	67	18.313	34	68.59	207
Aug. 8.4	52.632	57	22.64	65	18.237	76	70.44	185
18.4	52.529	103	23.25	61	18.123	114	72.00	156
28.3	52.387	142	23.76	51	17.976	147	73.26	126
Sept. 7.3	52.210	177	24.16	40	17.800	176	74.21	95
17.3	52.010	200	24.40	24	17.606	194	74.81	60
27.3	51.797	213	24.49	9	17.401	205	75.06	25
Oct. 7.2	51.584	213	24.40	9	17.196	205	74.95	11
17.2	51.382	202	24.13	27	16.999	197	74.48	47
27.2	51.203	179	23.69	44	16.820	179	73.65	83
Nov. 6.1	51.058	145	23.11	58	16.669	151	72.46	119
16.1	50.956	102	22.41	70	16.553	116	70.95	151
26.1	50.904	52	21.63	78	16.478	75	69.14	181
Dec. 6.1	50.907	3	20.81	82	16.447	31	67.05	209
16.0	50.963	56	19.97	84	16.463	16	64.77	228
26.0	51.074	111	19.16	81	16.526	63	62.34	243
36.0	51.235	161	18.39	77	16.634	108	59.84	250
Mean Place	47.718		26.53		14.753		54.57	
Sec δ, Tan δ	1.212		−0.685		1.076		+0.399	
$D_\psi\alpha$, $D_\omega\alpha$	+0.08		0.00		+0.05		0.00	
$D_\psi\delta$, $D_\omega\delta$	0.0		−1.0		0.0		−1.0	

Washington Mean Time.	α Telescopii. Mag. 3.8 Right Ascension.		Declination.		χ Draconis. Mag. 3.7 Right Ascension.		Declination.
	h m 18 20		° ′ −46 0		h m 18 22		° +72
	s		″		s		″
Jan. 1.0	57.592		48.15		26.30		54.88
11.0	57.809	217	46.71	144	26.41	11	51.38
20.9	58.077	268	45.38	133	26.65	24	47.97
30.9	58.387	310	44.18	120	27.02	37	44.81
Feb. 9.9	58.732	345	43.11	107	27.52	50	41.99
19.9	59.104	372	42.21	90	28.11	59	39.66
Mar. 1.8	59.497	393	41.47	74	28.79	68	37.87
11.8	59.903	406	40.88	59	29.52	73	36.70
21.8	60.316	413	40.47	41	30.29	77	36.20
31.7	60.731	415	40.24	23	31.06	77	36.36
Apr. 10.7	61.144	413	40.16	8	31.82	76	37.17
20.7	61.546	402	40.26	10	32.53	71	38.61
30.7	61.934	388	40.55	29	33.19	66	40.60
May 10.6	62.301	367	41.00	45	33.76	57	43.08
20.6	62.639	338	41.64	64	34.23	47	45.94
30.6	62.942	303	42.43	79	34.60	37	49.11
June 9.6	63.204	262	43.38	95	34.85	25	52.48
19.5	63.418	214	44.45	107	34.98	13	55.96
29.5	63.580	162	45.64	119	34.97	1	59.45
July 9.5	63.685	105	46.89	125	34.84	13	62.86
19.4	63.731	46	48.17	128	34.60	24	66.11
29.4	63.717	14	49.42	125	34.23	37	69.11
Aug. 8.4	63.644	73	50.60	118	33.75	48	71.82
18.4	63.518	126	51.67	107	33.18	57	74.17
28.3	63.344	174	52.57	90	32.53	65	76.10
Sept. 7.3	63.130	214	53.25	68	31.82	71	77.58
17.3	62.889	241	53.70	45	31.05	77	78.58
27.3	62.631	258	53.86	16	30.26	79	79.05
Oct. 7.2	62.373	258	53.72	14	29.46	80	78.99
17.2	62.126	247	53.30	42	28.68	78	78.41
27.2	61.907	219	52.59	71	27.93	75	77.29
Nov. 6.1	61.726	181	51.64	95	27.24	69	75.66
16.1	61.595	131	50.46	118	26.63	61	73.54
26.1	61.522	73	49.12	134	26.12	51	70.98
Dec. 6.1	61.511	11	47.67	145	25.74	38	68.03
16.0	61.567	56	46.16	151	25.47	27	64.79
26.0	61.685	118	44.64	152	25.34	13	61.35
36.0	61.863	178	43.17	147	25.36	2	57.81
Mean Place	58.065		52.17		31.194		52.60
Sec δ, Tan δ	1.440		−1.036		3.363		+3.211
$D_\psi\alpha$, $D_\omega\alpha$	+0.09		+0.01		−0.02		−0.02
$D_\psi\delta$, $D_\omega\delta$	0.0		−1.0		0.0		−1.0

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Sagittarii. Mag. 2.9				c Serpentis. Mag. 5.4				1 Aquilæ. Mag. 4.1				ζ Pavonis. Mag. 4.1			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 18 22		° ′ −25 27		h m 18 25		° ′ − 2 2		h m 18 30		° ′ − 8 17		h m 18 33		° ′ −71 29	
	s		″		s		″		s		″		s		″	
Jan. 1.0	58.056		60.76		27.732		16.74		47.674		63.44		32.46		54.50	
11.0	58.230	174	60.56	20	27.880	148	17.95	121	47.822	148	64.27	83	32.80	34	51.72	278
20.9	58.443	213	60.40	16	28.063	183	19.15	120	48.004	182	65.09	82	33.26	46	49.09	263
30.9	58.688	245	60.26	14	28.274	211	20.25	110	48.218	214	65.86	77	33.83	57	46.66	243
Feb. 9.9	58.959	271	60.13	13	28.511	237	21.21	96	48.456	238	66.51	65	34.48	65	44.50	216
19.9	59.250	291	60.00	13	28.766	255	22.00	79	48.714	258	67.04	53	35.21	73	42.64	186
Mar. 1.8	59.557	307	59.84	16	29.037	271	22.53	53	48.987	273	67.38	34	36.00	79	41.12	152
11.8	59.873	316	59.64	20	29.318	281	22.81	28	49.271	284	67.51	13	36.82	82	39.97	115
21.8	60.195	322	59.39	25	29.605	287	22.79	2	49.562	291	67.43	8	37.66	84	39.20	77
31.7	60.520	325	59.11	28	29.895	290	22.50	29	49.856	294	67.11	32	38.52	86	38.81	39
Apr. 10.7	60.843	323	58.79	32	30.183	288	21.92	58	50.150	294	66.58	53	39.37	85	38.80	1
20.7	61.159	316	58.45	34	30.466	283	21.10	82	50.439	289	65.86	72	40.21	84	39.18	38
30.7	61.464	305	58.10	35	30.739	273	20.05	105	50.719	280	64.98	88	41.01	80	39.94	76
May 10.6	61.754	290	57.77	33	30.998	259	18.84	121	50.986	267	63.98	100	41.76	75	41.06	112
20.6	62.024	270	57.47	30	31.237	239	17.51	133	51.234	248	62.89	109	42.45	69	42.50	144
30.6	62.268	244	57.24	23	31.454	217	16.09	142	51.460	226	61.76	113	43.05	60	44.24	174
June 9.6	62.480	212	57.07	17	31.641	187	14.65	144	51.657	197	60.63	113	43.57	52	46.25	201
19.5	62.657	177	56.98	9	31.797	156	13.22	143	51.821	164	59.54	109	43.98	41	48.45	220
29.5	62.793	136	56.97	1	31.914	117	11.84	138	51.948	127	58.51	103	44.28	30	50.81	236
July 9.5	62.887	94	57.06	9	31.993	79	10.56	128	52.036	88	57.56	95	44.46	18	53.25	244
19.4	62.934	47	57.20	14	32.029	36	9.39	117	52.082	46	56.72	84	44.51	5	55.70	245
29.4	62.933	1	57.40	20	32.024	5	8.36	103	52.084	2	56.02	70	44.43	8	58.08	238
Aug. 8.4	62.887	46	57.65	25	31.977	47	7.46	90	52.045	39	55.42	60	44.23	20	60.32	224
18.4	62.798	89	57.89	24	31.893	84	6.73	73	51.966	79	54.94	48	43.92	31	62.32	200
28.3	62.671	127	58.12	23	31.775	118	6.15	58	51.851	115	54.58	36	43.50	42	64.02	170
Sept. 7.3	62.512	159	58.31	19	31.628	147	5.73	42	51.709	142	54.33	25	43.00	50	65.35	133
17.3	62.332	180	58.45	14	31.462	166	5.45	28	51.544	165	54.19	14	42.43	57	66.25	90
27.3	62.140	192	58.51	6	31.285	177	5.34	11	51.368	176	54.14	5	41.82	61	66.67	42
Oct. 7.2	61.945	195	58.49	2	31.106	179	5.38	4	51.188	180	54.18	4	41.21	61	66.59	8
17.2	61.761	184	58.38	11	30.936	170	5.57	19	51.016	172	54.31	13	40.61	60	65.99	60
27.2	61.597	164	58.19	19	30.783	153	5.93	36	50.863	153	54.54	23	40.06	55	64.90	109
Nov. 6.1	61.464	133	57.93	26	30.657	126	6.44	51	50.736	127	54.86	32	39.58	48	63.34	156
16.1	61.369	95	57.63	30	30.564	93	7.11	67	50.641	95	55.28	42	39.19	39	61.36	198
26.1	61.320	49	57.31	32	30.512	52	7.92	81	50.587	54	55.80	52	38.91	28	59.06	230
Dec. 6.1	61.320	0	56.98	33	30.503	9	8.89	97	50.577	10	56.42	62	38.76	15	56.48	258
16.0	61.370	50	56.68	30	30.538	35	9.98	109	50.612	35	57.15	73	38.76	0	53.73	275
26.0	61.469	99	56.42	26	30.617	79	11.13	115	50.691	79	57.93	78	38.88	12	50.91	282
36.0	61.614	145	56.21	21	30.738	121	12.36	123	50.813	122	58.77	84	39.14	26	48.09	282
Mean Place	58.317		64.03		28.038		19.41		47.949		66.32		34.472		58.69	
Sec δ, Tan δ	1.108		−0.476		1.001		−0.035		1.011		−0.146		3.151		−2.988	
$D_\psi \alpha$, $D_\omega \alpha$	+0.07		0.00		+0.06		0.00		+0.06		0.00		+0.14		+0.03	
$D_\psi \delta$, $D_\omega \delta$	0.0		−1.0		0.0		−1.0		+0.1		−1.0		+0.1		−1.0	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	6 Aquilæ. Mag. 4.5				λ Pavonis. Mag. 4.4				β Lyræ. Var. 3.4–4.1				50 Draconis. Mag. 5.4			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 18 42		° ′ − 4 49		h m 18 44		° ′ −62 16		h m 18 47		° ′ +33 15		h m 18 48		° ′ +75 20	
	s		″		s		″		s		″		s		″	
Jan. 1.0	52.304	133	65.10	100	41.79	24	51.96	242	4.500	100	68.18	287	53.91	0	25.04	345
11.0	52.437	169	66.10	97	42.03	32	49.54	233	4.600	144	65.31	282	53.91	16	21.59	342
21.0	52.606	200	67.07	90	42.35	39	47.21	216	4.744	185	62.49	263	54.07	34	18.17	325
30.9	52.806	225	67.97	79	42.74	44	45.05	198	4.929	222	59.86	238	54.41	47	14.92	296
Feb. 9.9	53.031	246	68.76	61	43.18	50	43.07	173	5.151	253	57.48	200	54.88	61	11.96	256
19.9	53.277	264	69.37	41	43.68	54	41.34	147	5.404	277	55.48	155	55.49	72	9.40	206
Mar. 1.8	53.541	276	69.78	16	44.22	56	39.87	118	5.681	299	53.93	104	56.21	82	7.34	149
11.8	53.817	285	69.94	9	44.78	60	38.69	89	5.980	311	52.89	48	57.03	86	5.85	85
21.8	54.102	291	69.85	34	45.38	60	37.80	56	6.291	319	52.41	9	57.89	89	5.00	19
31.8	54.393	291	69.51	60	45.98	60	37.24	25	6.610	320	52.50	65	58.78	89	4.81	48
Apr. 10.7	54.684	289	68.91	82	46.58	57	36.99	7	6.930	316	53.15	118	59.67	86	5.29	110
20.7	54.973	282	68.09	101	47.15	58	37.06	39	7.246	303	54.33	167	60.53	80	6.39	169
30.7	55.255	270	67.08	118	47.73	54	37.45	72	7.549	287	56.00	209	61.33	71	8.08	222
May 10.7	55.525	252	65.90	127	48.27	50	38.17	100	7.836	262	58.09	243	62.04	62	10.30	265
20.6	55.777	232	64.63	134	48.77	46	39.17	129	8.098	233	60.52	271	62.66	50	12.95	302
30.6	56.009	203	63.29	136	49.23	40	40.46	154	8.331	198	63.23	289	63.16	36	15.97	328
June 9.6	56.212	172	61.93	133	49.63	33	42.00	175	8.529	157	66.12	300	63.52	22	19.25	344
19.5	56.384	136	60.60	127	49.96	25	43.75	190	8.686	114	69.12	301	63.74	8	22.69	353
29.5	56.520	96	59.33	117	50.21	17	45.65	202	8.800	66	72.13	295	63.82	8	26.22	349
July 9.5	56.616	54	58.16	107	50.38	7	47.67	207	8.866	19	75.08	284	63.74	23	29.71	340
19.5	56.670	11	57.09	93	50.45	1	49.74	205	8.885	30	77.92	263	63.51	36	33.11	323
29.4	56.681	32	56.16	80	50.44	9	51.79	197	8.855	77	80.55	239	63.15	49	36.34	296
Aug. 8.4	56.649	71	55.36	64	50.35	18	53.76	179	8.778	120	82.94	209	62.66	61	39.30	265
18.4	56.578	108	54.72	50	50.17	25	55.55	157	8.658	160	85.03	176	62.05	73	41.95	228
28.4	56.470	137	54.22	36	49.92	32	57.12	126	8.498	192	86.79	140	61.32	81	44.23	188
Sept. 7.3	56.333	161	53.86	22	49.60	37	58.38	91	8.306	217	88.19	99	60.51	88	46.11	141
17.3	56.172	174	53.64	9	49.23	39	59.29	51	8.089	232	89.18	58	59.63	92	47.52	90
27.3	55.998	178	53.55	3	48.84	41	59.80	8	7.857	239	89.76	14	58.71	94	48.42	40
Oct. 7.2	55.820	174	53.58	16	48.43	40	59.88	37	7.618	234	89.90	29	57.77	94	48.82	13
17.2	55.646	157	53.74	29	48.03	37	59.51	81	7.384	219	89.61	73	56.83	92	48.69	68
27.2	55.489	134	54.03	41	47.66	31	58.70	122	7.165	197	88.88	116	55.91	87	48.01	121
Nov. 6.2	55.355	101	54.44	53	47.35	26	57.48	160	6.968	163	87.72	158	55.04	78	46.80	172
16.1	55.254	64	54.97.	67	47.09	19	55.88	190	6.805	124	86.14	196	54.26	68	45.08	221
26.1	55.190	22	55.64	77	46.90	9	53.98	216	6.681	80	84.18	229	53.58	57	42.87	264
Dec. 6.1	55.168	22	56.41	87	46.81	1	51.82	232	6.601	31	81.89	257	53.01	42	40.23	301
16.1	55.190	65	57.28	95	46.80	8	49.50	241	6.570	18	79.32	276	52.59	27	37.22	326
26.0	55.255	106	58.23	100	46.88	19	47.09	243	6.588	67	76.56	287	52.32	10	33.96	343
36.0	55.361		59.23		47.07		44.66		6.655		73.69		52.22		30.53	
Mean Place	52.597		68.17		42.917		55.33		5.348		64.27		59.741		19.72	
Sec δ, Tan δ	1.004		−0.085		2.150		−1.903		1.196		+0.656		3.952		+3.823	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		0.00		+0.11		+0.02		+0.04		−0.01		−0.04		−0.05	
$D_\psi\delta$, $D_\omega\delta$	+0.1		−1.0		+0.1		−1.0		+0.1		−1.0		+0.1		−1.0	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Lyræ. Mag. 3.3 Right Ascension.		γ Lyræ. Mag. 3.3 Declination.		ε Aquilæ. Mag. 4.2 Right Ascension.		ε Aquilæ. Mag. 4.2 Declination.		ζ Sagittarii. Mag. 2.7 Right Ascension.		ζ Sagittarii. Mag. 2.7 Declination.		ζ Aquilæ. Mag. 3.0 Right Ascension.		ζ Aquilæ. Mag. 3.0 Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	18 55		+32 34		18 55		+14 57		18 57		−29 59		19 1		+13 44	
	s		″		s		″		s		″		s		″	
Jan. 1.0	53.968		43.93		56.279		30.16		27.214		47.57		40.765		35.71	
		90		282		106		206		142		62		100		199
11.0	54.058		41.11		56.385		28.10		27.356		46.95		40.865		33.72	
		135		278		142		201		184		61		137		195
21.0	54.193		38.33		56.527		26.09		27.540		46.34		41.002		31.77	
		175		262		176		190		220		60		172		183
30.9	54.368		35.71		56.703		24.19		27.760		45.74		41.174		29.94	
		213		238		207		169		251		59		202		164
Feb. 9.9	54.581		33.33		56.910		22.50		28.011		45.15		41.376		28.30	
		243		201		231		141		276		59		226		137
19.9	54.824		31.32		57.141		21.09		28.287		44.56		41.602		26.93	
		270		158		252		107		297		59		248		103
Mar. 1.8	55.094		29.74		57.393		20.02		28.584		43.97		41.850		25.90	
		293		108		268		67		313		59		265		65
11.8	55.387		28.66		57.661		19.35		28.897		43.38		42.115		25.25	
		307		53		280		24		326		60		278		23
21.8	55.694		28.13	—	57.941		19.11	—	29.223		42.78		42.393		25.02	—
		316		4		288		19		333		59		287		19
31.8	56.010		28.17		58.229		19.30		29.556		42.19		42.680		25.21	
		319		59		292		63		337		59		291		62
Apr. 10.7	56.329		28.76		58.521		19.93		29.893		41.60		42.971		25.83	
		316		112		289		103		336		56		291		102
20.7	56.645		29.88		58.810		20.96		30.229		41.04		43.262		26.85	
		306		161		284		139		331		51		285		136
30.7	56.951		31.49		59.094		22.35		30.560		40.53		43.547		28.21	
		291		203		272		172		321		44		275		169
May 10.7	57.242		33.52		59.366		24.07		30.881		40.09		43.822		29.90	
		269		239		254		196		303		36		258		192
20.6	57.511		35.91		59.620		26.03		31.184		39.73		44.080		31.82	
		240		268		232		216		281		24		237		212
30.6	57.751		38.59		59.852		28.19		31.465		39.49		44.317		33.94	
		206		286		204		227		251		13		208		223
June 9.6	57.957		41.45		60.056		30.46		31.716		39.36		44.525		36.17	
		166		297		170		232		216		0		176		227
19.5	58.123		44.42		60.226		32.78		31.932		39.36		44.701		38.44	
		124		300		134		232		176		12		140		227
29.5	58.247		47.42		60.360		35.10		32.108		39.48		44.841		40.71	
		77		296		93		224		131		26		99		220
July 9.5	58.324		50.38		60.453		37.34		32.239		39.74		44.940		42.91	
		29		284		50		211		83		36		56		208
19.5	58.353	—	53.22		60.503		39.45		32.322		40.10		44.996		44.99	
		19		266		6		196		32		44		13		192
29.4	58.334		55.88		60.509	—	41.41		32.354	—	40.54		45.009	—	46.91	
		66		243		36		176		17		50		31		172
Aug. 8.4	58.268		58.31		60.473		43.17		32.337		41.04		44.978		48.63	
		111		213		78		151		65		52		72		150
18.4	58.157		60.44		60.395		44.68		32.272		41.56		44.906		50.13	
		151		182		115		126		109		52		110		124
28.4	58.006		62.26		60.280		45.94		32.163		42.08		44.796		51.37	
		184		145		145		99		145		47		140		98
Sept. 7.3	57.822		63.71		60.135		46.93		32.018		42.55		44.656		52.35	
		211		107		171		69		176		40		166		70
17.3	57.611		64.78		59.964		47.62		31.842		42.95		44.490		53.05	
		227		64		185		41		194		30		182		41
27.3	57.384		65.42		59.779		48.03		31.648		43.25		44.308		53.46	
		235		23		192		9		202		17		189		11
Oct. 7.2	57.149		65.65	—	59.587		48.12	—	31.446		43.42		44.119		53.57	—
		232		21		190		21		199		3		188		18
17.2	56.917		65.44		59.397		47.91		31.247		43.45	—	43.931		53.39	
		219		64		177		51		185		11		176		47
27.2	56.698		64.80		59.220		47.40		31.062		43.34		43.755		52.92	
		197		108		154		83		158		25		154		78
Nov. 6.2	56.501		63.72		59.066		46.57		30.904		43.09		43.601		52.14	
		166		147		126		111		125		36		127		105
16.1	56.335		62.25		58.940		45.46		30.779		42.73		43.474		51.09	
		128		188		91		138		82		46		93		132
26.1	56.207		60.37		58.849		44.08		30.697		42.27		43.381		49.77	
		86		221		51		163		35		53		53		155
Dec. 6.1	56.121		58.16		58.798		42.45		30.662	—	41.74		43.328		48.22	
		38		249		7		182		14		58		11		175
16.1	56.083	—	55.67		58.791	—	40.63		30.676		41.16		43.317	—	46.47	
		10		270		35		197		64		60		31		190
26.0	56.093		52.97		58.826		38.66		30.740		40.56		43.348		44.57	
		58		282		77		206		111		61		73		198
36.0	56.151		50.15		58.903		36.60		30.851		39.95		43.421		42.59	
Mean Place	54.785		39.40		56.746		26.25		27.519		50.36		41.211		31.58	
Sec δ, Tan δ	1.187		+0.639		1.035		+0.267		1.155		−0.577		1.029		+0.245	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.04		−0.01		+0.05		0.00		+0.08		+0.01		+0.05		0.00	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.1		−1.0		+0.1		−1.0		+0.1		−1.0		+0.1		−1.0	

FOR THE UPPER TRANSIT AT

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ψ Sagittarii. Mag. 4.9				δ Draconis. Mag. 3.2				d Sagittarii. Mag. 5.0				θ Lyræ. Mag. 4.5			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 19 10		° ′ −25 23		h m 19 12		° ′ +67 30		h m 19 12		° ′ −19 5		h m 19 13		° ′ +37 59	
	s		″		s		″		s		″		s		″	
Jan. 1.0	34.209	123	48.21	37	29.12	2	76.08	342	53.521	115	50.46	2	32.403	63	25.96	295
11.0	34.332	163	47.84	39	29.10	9	72.66	345	53.636	153	50.48	1	32.466	112	23.01	295
21.0	34.495	198	47.45	40	29.19	19	69.21	334	53.789	186	50.49	4	32.578	157	20.06	282
30.9	34.693	228	47.05	42	29.38	30	65.87	308	53.975	217	50.45	9	32.735	199	17.24	258
Feb. 9.9	34.921	255	46.63	46	29.68	40	62.79	274	54.192	240	50.36	17	32.934	235	14.66	223
19.9	35.176	276	46.17	51	30.08	46	60.05	227	54.432	263	50.19	27	33.169	269	12.43	181
Mar. 1.9	35.452	293	45.66	56	30.54	53	57.78	171	54.695	279	49.92	38	33.438	295	10.62	130
11.8	35.745	308	45.10	61	31.07	57	56.07	111	54.974	292	49.54	49	33.733	314	9.32	74
21.8	36.053	317	44.49	67	31.64	61	54.96	43	55.266	304	49.05	61	34.047	329	8.58	16
31.8	36.370	324	43.82	71	32.25	61	54.53	21	55.570	309	48.44	72	34.376	335	8.42	44
Apr. 10.7	36.694	325	43.11	72	32.86	59	54.74	88	55.879	311	47.72	80	34.711	336	8.86	100
20.7	37.019	322	42.39	72	33.45	60	55.62	148	56.190	309	46.92	85	35.047	328	9.86	152
30.7	37.341	314	41.67	67	34.05	54	57.10	203	56.499	299	46.07	87	35.375	313	11.38	200
May 10.7	37.655	299	41.00	63	34.59	49	59.13	251	56.798	288	45.20	88	35.688	292	13.38	240
20.6	37.954	279	40.37	55	35.08	40	61.64	292	57.086	270	44.32	84	35.980	263	15.78	272
30.6	38.233	252	39.82	44	35.48	33	64.56	322	57.356	243	43.48	77	36.243	228	18.50	295
June 9.6	38.485	220	39.38	32	35.81	25	67.78	343	57.599	212	42.71	66	36.471	188	21.45	312
19.6	38.705	182	39.06	19	36.06	15	71.21	357	57.811	176	42.05	57	36.659	140	24.57	318
29.5	38.887	140	38.87	6	36.21	5	74.78	360	57.987	135	41.48	43	36.799	91	27.75	317
July 9.5	39.027	91	38.81	6	36.26	6	78.38	352	58.122	91	41.05	31	36.890	42	30.92	308
19.5	39.118	44	38.87	18	36.20	15	81.90	341	58.213	44	40.74	18	36.932	11	34.00	292
29.4	39.162	3	39.05	27	36.05	24	85.31	319	58.257	2	40.56	8	36.921	61	36.92	271
Aug. 8.4	39.159	50	39.32	33	35.81	33	88.50	289	58.255	46	40.48	2	36.860	109	39.63	241
18.4	39.109	93	39.65	37	35.48	41	91.39	256	58.209	88	40.50	9	36.751	154	42.04	209
28.4	39.016	132	40.02	37	35.07	48	93.95	216	58.121	125	40.59	14	36.597	190	44.13	173
Sept. 7.3	38.884	161	40.39	34	34.59	53	96.11	172	57.996	153	40.73	18	36.407	221	45.86	133
17.3	38.723	181	40.73	29	34.06	57	97.83	123	57.843	173	40.91	19	36.186	241	47.19	90
27.3	38.542	192	41.02	21	33.49	59	99.06	72	57.670	183	41.10	17	35.945	252	48.09	46
Oct. 7.3	38.350	191	41.23	13	32.90	60	99.78	19	57.487	182	41.27	15	35.693	254	48.55	2
17.2	38.159	180	41.36	3	32.30	59	99.97	37	57.305	171	41.42	12	35.439	244	48.53	47
27.2	37.979	156	41.39	6	31.71	56	99.60	92	57.134	151	41.54	9	35.195	225	48.06	94
Nov. 6.2	37.823	125	41.33	15	31.15	51	98.68	147	56.983	121	41.63	7	34.970	196	47.12	139
16.1	37.698	88	41.18	23	30.64	45	97.21	197	56.862	84	41.70	5	34.774	159	45.73	182
26.1	37.610	44	40.95	27	30.19	38	95.24	244	56.778	45	41.75	4	34.615	117	43.91	220
Dec. 6.1	37.566	2	40.68	31	29.81	29	92.80	283	56.733	0	41.79	4	34.498	71	41.71	253
16.1	37.568	49	40.37	33	29.52	18	89.97	316	56.733	43	41.83	4	34.427	20	39.18	276
26.0	37.617	93	40.04	34	29.34	9	86.81	337	56.776	87	41.87	4	34.407	29	36.42	293
36.0	37.710		39.70		29.25		83.44		56.863		41.91		34.436		33.49	
Mean Place	34.489		50.89		32.458		68.50		53.780		53.38		33.349		19.84	
Sec δ, Tan δ	1.107		−0.475		2.616		+2.417		1.058		−0.346		1.269		+0.781	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.07		+0.01		0.00		−0.05		+0.07		+0.01		+0.04		−0.02	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.1		−1.0		+0.1		−1.0		+0.1		−1.0		+0.1		−0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ω Aquilae. Mag. 5.1 Right Ascension.		Declination.		κ Cygni. Mag. 4.0 Right Ascension.		Declination.		τ Draconis. Mag. 4.6 Right Ascension.		Declination.		δ Aquilae. Mag. 3.4 Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	19 14		+11 26		19 15		+53 12		19 17		+78 12		19 21		+ 2 57	
	s		″		s		″		s		″		s		″	
Jan. 1.0	0.462		58.77		12.227		73.81		2.50		28.13		24.551		12.54	
11.0	0.552	90	56.94	183	12.260	33	70.51	330	2.42	8	24.74	339	24.641	90	11.21	13
21.0	0.680	128	55.14	180	12.361	101	67.20	331	2.48	6	21.31	343	24.768	127	9.90	13
30.9	0.841	161	53.45	169	12.524	163	64.00	320	2.70	22	17.96	335	24.927	159	8.68	12
Feb. 9.9	1.031	190	51.93	152	12.747	223	61.05	295	3.05	35	14.85	311	25.114	187	7.59	10
19.9	1.248	217	50.66	127	13.023	276	58.46	259	3.52	47	12.06	279	25.328	214	6.71	8
Mar. 1.9	1.488	240	49.70	96	13.346	323	56.33	213	4.10	58	9.74	232	25.564	236	6.10	6
11.8	1.746	258	49.10	60	13.707	361	54.74	159	4.77	67	7.94	180	25.819	255	5.78	3
21.8	2.018	272	48.90	20	14.098	391	53.76	98	5.50	73	6.75	119	26.087	268	5.77	1
31.8	2.301	283	49.10	20	14.506	408	53.42	34	6.29	79	6.20	55	26.367	280	6.10	3
Apr. 10.8	2.590	289	49.71	61	14.924	418	53.71	29	7.08	79	6.32	12	26.655	288	6.76	6
20.7	2.882	292	50.69	98	15.339	415	54.65	94	7.86	78	7.09	77	26.947	292	7.72	9
30.7	3.170	288	52.02	133	15.742	403	56.17	152	8.60	74	8.48	139	27.237	290	8.95	12
May 10.7	3.450	280	53.65	163	16.124	382	58.22	205	9.29	69	10.41	193	27.520	283	10.49	14
20.6	3.714	264	55.50	185	16.472	348	60.74	252	9.91	62	12.84	243	27.791	271	12.04	16
30.6	3.960	246	57.55	205	16.780	308	63.62	288	10.43	52	15.68	284	28.042	251	13.79	17
June 9.6	4.178	218	59.70	215	17.039	259	66.81	319	10.85	42	18.85	317	28.271	229	15.61	18
19.6	4.367	189	61.90	220	17.243	204	70.18	337	11.14	29	22.24	339	28.470	199	17.44	18
29.5	4.519	152	64.09	219	17.386	143	73.67	349	11.31	17	25.78	354	28.633	163	19.23	17
July 9.5	4.631	112	66.21	212	17.466	80	77.17	350	11.35	4	29.36	358	28.759	126	20.95	17
19.5	4.701	70	68.22	201	17.481	15	80.60	343	11.26	9	32.89	353	28.842	83	22.53	15
29.5	4.727	26	70.08	186	17.428	53	83.89	329	11.04	22	36.31	342	28.882	40	23.98	14
Aug. 8.4	4.709	18	71.74	166	17.313	115	86.95	306	10.70	34	39.54	323	28.878	4	25.26	13
18.4	4.649	60	73.19	145	17.139	174	89.73	278	10.25	45	42.49	295	28.834	44	26.33	10
28.4	4.552	97	74.40	121	16.910	229	92.17	244	9.69	56	45.12	263	28.749	85	27.22	8
Sept. 7.3	4.421	131	75.36	96	16.634	276	94.21	204	9.04	65	47.36	224	28.630	119	27.90	6
17.3	4.264	157	76.06	70	16.321	313	95.82	161	8.32	72	49.18	182	28.485	145	28.39	4
27.3	4.089	175	76.49	43	15.982	339	96.95	113	7.55	77	50.52	134	28.319	166	28.65	2
Oct. 7.3	3.904	185	76.64	15	15.627	355	97.59	64	6.75	80	51.35	83	28.144	175	28.73	
17.2	3.720	184	76.52	12	15.270	357	97.70	11	5.94	81	51.65	30	27.968	176	28.60	1
27.2	3.546	174	76.12	40	14.922	348	97.29	41	5.13	81	51.40	25	27.801	167	28.27	3
Nov. 6.2	3.390	156	75.44	68	14.595	327	96.34	95	4.36	77	50.60	80	27.651	150	27.76	5
16.2	3.261	129	74.51	93	14.302	293	94.88	146	3.65	71	49.26	134	27.528	123	27.05	7
26.1	3.164	97	73.32	119	14.051	251	92.93	195	3.02	63	47.39	187	27.435	93	26.18	8
Dec. 6.1	3.105	59	71.92	140	13.852	199	90.54	239	2.47	55	45.05	234	27.379	56	25.14	10
16.1	3.086	19	70.32	160	13.713	139	87.78	276	2.04	43	42.28	277	27.363	16	23.95	11
26.0	3.108	22	68.58	174	13.636	77	84.71	307	1.74	30	39.19	309	27.387	24	22.67	12
36.0	3.170	62	66.76	182	13.626	10	81.45	326	1.57	17	35.87	332	27.450	63	21.33	13
Mean Place	0.868		54.23		13.906		66.67		7.262		19.82		24.869		8.31	
Sec δ, Tan δ	1.020		+0.203		1.670		+1.338		3.462		+3.314		1.001		+0.052	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		0.00		+0.03		−0.03		−0.02		−0.07		+0.06		0.00	
$D_\psi\delta$, $D_\omega\delta$	+0.1		−0.9		+0.1		−0.9		+0.1		−0.9		+0.1		−0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Cygni. Mag. 3.2 Right Ascension.		Declination.		ι Cygni. Mag. 3.9 Right Ascension.		Declination.		μ Aquilæ. Mag. 4.6 Right Ascension.		Declination.		h Sagittarii. Mag. 4.7 Right Ascension.		Declination.	
	h m 19 27		° ′ +27 47		h m 19 27		° ′ +51 33		h m 19 30		° ′ + 7 12		h m 19 31		° ′ −25 3	
	s		″		s		″		s		″		s		″	
Jan. 1.0	26.624	61	25.70	254	38.342	18	32.31	323	7.637	78	26.99	156	46.495	100	46.23	40
11.0	26.685	102	23.16	255	38.360	82	29.08	327	7.715	115	25.43	153	46.595	138	45.83	44
21.0	26.787	141	20.61	244	38.442	144	25.81	318	7.830	147	23.90	145	46.733	176	45.39	47
31.0	26.928	179	18.17	225	38.586	201	22.63	295	7.977	179	22.45	130	46.909	207	44.92	52
Feb. 9.9	27.107	212	15.92	195	38.787	254	19.68	263	8.156	205	21.15	106	47.116	234	44.40	57
19.9	27.319	239	13.97	156	39.041	300	17.05	219	8.361	228	20.09	79	47.350	260	43.83	63
Mar. 1.9	27.558	264	12.41	112	39.341	340	14.86	167	8.589	249	19.30	48	47.610	279	43.20	72
11.8	27.822	284	11.29	63	39.681	370	13.19	109	8.838	265	18.82	12	47.889	295	42.48	76
21.8	28.106	298	10.66	10	40.051	393	12.10	44	9.103	278	18.70	25	48.184	311	41.72	82
31.8	28.404	308	10.56	42	40.444	403	11.66	18	9.381	286	18.95	61	48.495	319	40.90	87
Apr. 10.8	28.712	311	10.98	95	40.847	406	11.84	80	9.667	291	19.56	95	48.814	325	40.03	89
20.7	29.023	309	11.93	140	41.253	397	12.64	141	9.958	291	20.51	127	49.139	326	39.14	89
30.7	29.332	298	13.33	183	41.650	380	14.05	195	10.249	286	21.78	154	49.465	320	38.25	85
May 10.7	29.630	284	15.16	219	42.030	353	16.00	241	10.535	274	23.32	175	49.785	309	37.40	79
20.7	29.914	261	17.35	248	42.383	314	18.41	280	10.809	255	25.07	190	50.094	293	36.61	69
30.6	30.175	233	19.83	268	42.697	270	21.21	312	11.064	233	26.97	200	50.387	267	35.92	58
June 9.6	30.408	197	22.51	281	42.967	219	24.33	333	11.297	203	28.97	203	50.654	238	35.34	45
19.6	30.605	159	25.32	287	43.186	162	27.66	345	11.500	169	31.00	202	50.892	200	34.89	30
29.5	30.764	115	28.19	286	43.348	100	31.11	349	11.669	130	33.02	195	51.092	159	34.59	15
July 9.5	30.879	69	31.05	278	43.448	37	34.60	345	11.799	89	34.97	184	51.251	113	34.44	0
19.5	30.948	21	33.83	261	43.485	26	38.05	332	11.888	46	36.81	168	51.364	65	34.44	13
29.5	30.969	26	36.44	243	43.459	90	41.37	312	11.934	1	38.49	151	51.429	16	34.57	25
Aug. 8.4	30.943	71	38.87	217	43.369	148	44.49	285	11.935	42	40.00	131	51.445	32	34.82	34
18.4	30.872	113	41.04	190	43.221	202	47.34	253	11.893	81	41.31	108	51.413	77	35.16	39
28.4	30.759	150	42.94	156	43.019	251	49.87	215	11.812	116	42.39	86	51.336	117	35.55	43
Sept. 7.4	30.609	178	44.50	121	42.768	287	52.02	172	11.696	144	43.25	62	51.219	148	35.98	42
17.3	30.431	199	45.71	84	42.481	317	53.74	127	11.552	165	43.87	39	51.071	174	36.40	38
27.3	30.232	213	46.55	46	42.164	334	55.01	78	11.387	176	44.26	14	50.897	186	36.78	32
Oct. 7.3	30.019	215	47.01	5	41.830	339	55.79	27	11.211	178	44.40	9	50.711	190	37.10	23
17.2	29.804	207	47.06	36	41.491	334	56.06	26	11.033	171	44.31	33	50.521	182	37.33	14
27.2	29.597	192	46.70	75	41.157	314	55.80	78	10.862	155	43.98	54	50.339	164	37.47	5
Nov. 6.2	29.405	166	45.95	116	40.843	286	55.02	131	10.707	132	43.44	79	50.175	137	37.52	5
16.2	29.239	135	44.79	152	40.557	246	53.71	180	10.575	100	42.65	98	50.038	101	37.47	14
26.1	29.104	98	43.27	185	40.311	199	51.91	224	10.475	65	41.67	119	49.937	62	37.33	23
Dec. 6.1	29.006	56	41.42	215	40.112	144	49.67	265	10.410	27	40.48	135	49.875	18	37.10	27
16.1	28.950	13	39.27	236	39.968	85	47.02	296	10.383	13	39.13	147	49.857	27	36.83	32
26.1	28.937	31	36.91	253	39.883	23	44.06	317	10.396	52	37.66	155	49.884	69	36.51	36
36.0	28.968		34.38		39.860		40.89		10.448		36.11		49.953		36.15	
Mean Place	27.264		19.31		39.862		24.13		7.976		22.16		46.764		48.62	
Sec δ, Tan δ	1.130		+0.527		1.609		+1.260		1.008		+0.126		1.104		−0.468	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.05		−0.01		+0.03		−0.03		+0.06		0.00		+0.07		+0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.1		−0.9		+0.1		−0.9		+0.2		−0.9		+0.2		−0.9	

FOR THE UPPER TRANSIT AT

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	15 Cygni. Mag. 5.0 Right Ascension.		Declination.		*f* Sagittarii. Mag. 5.1 Right Ascension.		Declination.	
	h m 19 41		° ′ +37 9		h m 19 41		° ′ −19 57	
	s		″		s		″	
Jan. 1.0	20.525	32	37.37	282	38.058	85	21.90	10
11.0	20.557	79	34.55	285	38.143	124	21.80	14
21.0	20.636	125	31.70	279	38.267	158	21.66	21
31.0	20.761	168	28.91	259	38.425	189	21.45	27
Feb. 9.9	20.929	207	26.32	231	38.614	217	21.18	36
19.9	21.136	241	24.01	192	38.831	241	20.82	45
Mar. 1.9	21.377	272	22.09	145	39.072	263	20.37	57
11.9	21.649	298	20.64	91	39.335	279	19.80	70
21.8	21.947	317	19.73	36	39.614	294	19.10	80
31.8	22.264	330	19.37	21	39.908	307	18.30	89
Apr. 10.8	22.594	335	19.58	78	40.215	312	17.41	97
20.7	22.929	335	20.36	133	40.527	315	16.44	102
30.7	23.264	325	21.69	181	40.842	312	15.42	104
May 10.7	23.589	308	23.50	223	41.154	302	14.38	101
20.7	23.897	286	25.73	260	41.456	287	13.37	96
30.6	24.183	254	28.33	285	41.743	264	12.41	88
June 9.6	24.437	216	31.18	306	42.007	237	11.53	76
19.6	24.653	174	34.24	316	42.244	202	10.77	63
29.6	24.827	127	37.40	318	42.446	162	10.14	49
July 9.5	24.954	77	40.58	314	42.608	118	9.65	33
19.5	25.031	24	43.72	300	42.726	72	9.32	17
29.5	25.055	28	46.72	282	42.798	24	9.15	5
Aug. 8.4	25.027	77	49.54	258	42.822	22	9.10	7
18.4	24.950	124	52.12	228	42.800	67	9.17	17
28.4	24.826	164	54.40	194	42.733	106	9.34	25
Sept. 7.4	24.662	198	56.34	157	42.627	138	9.59	29
17.3	24.464	223	57.91	115	42.489	163	9.88	30
27.3	24.241	238	59.06	73	42.326	177	10.18	29
Oct. 7.3	24.003	245	59.79	27	42.149	182	10.47	27
17.3	23.758	240	60.06	19	41.967	176	10.74	22
27.2	23.518	228	59.87	65	41.791	160	10.96	17
Nov. 6.2	23.290	203	59.22	110	41.631	136	11.13	12
16.2	23.087	172	58.12	154	41.495	103	11.25	8
26.1	22.915	136	56.58	195	41.392	67	11.33	4
Dec. 6.1	22.779	93	54.63	228	41.325	26	11.37	0
16.1	22.686	47	52.35	258	41.299	16	11.37	3
26.1	22.639	0	49.77	277	41.315	58	11.34	5
36.0	22.639		47.00		41.373		11.29	
Mean Place	21.362		29.24		38.298		24.54	
Sec δ, Tan δ	1.255		+0.758		1.064		−0.363	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.04		−0.02		+0.07		+0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.2		−0.9		+0.2		−0.9	

Washington Mean Time.	γ Aquilæ. Mag. 2.8 Right Ascension.		Declination.		δ Cygni. Mag. 3.0 Right Ascension.		Declination.	
	h m 19 42		° ′ +10 24		h m 19 42		° ′ +44 55	
	s		″		s		″	
Jan. 1.0	24.174	63	59.33	169	25.532	15	65.57	304
11.0	24.237	99	57.64	167	25.547	69	62.53	309
21.0	24.336	134	55.97	159	25.616	122	59.44	302
31.0	24.470	166	54.38	144	25.738	172	56.42	284
Feb. 9.9	24.636	193	52.94	121	25.910	218	53.58	254
19.9	24.829	219	51.73	93	26.128	260	51.04	214
Mar. 1.9	25.048	241	50.80	58	26.388	296	48.90	165
11.9	25.289	260	50.22	21	26.684	324	47.25	110
21.8	25.549	274	50.01	18	27.008	348	46.15	50
31.8	25.823	286	50.19	57	27.356	362	45.65	11
Apr. 10.8	26.109	292	50.76	93	27.718	367	45.76	71
20.7	26.401	294	51.69	129	28.085	366	46.47	129
30.7	26.695	289	52.98	158	28.451	355	47.76	182
May 10.7	26.984	280	54.56	182	28.806	333	49.58	228
20.7	27.264	263	56.38	201	29.139	305	51.86	267
30.6	27.527	240	58.39	213	29.444	270	54.53	298
June 9.6	27.767	211	60.53	219	29.714	227	57.51	319
19.6	27.978	178	62.72	219	29.941	178	60.70	333
29.6	28.156	140	64.91	213	30.119	125	64.03	338
July 9.5	28.296	97	67.04	204	30.244	69	67.41	335
19.5	28.393	53	69.08	189	30.313	11	70.76	324
29.5	28.446	9	70.97	170	30.324	46	74.00	305
Aug. 8.4	28.455	34	72.67	151	30.278	99	77.05	281
18.4	28.421	75	74.18	127	30.179	151	79.86	250
28.4	28.346	111	75.45	103	30.028	194	82.36	216
Sept. 7.4	28.235	140	76.48	77	29.834	231	84.52	176
17.3	28.095	163	77.25	52	29.603	260	86.28	132
27.3	27.932	175	77.77	24	29.343	278	87.60	86
Oct. 7.3	27.757	180	78.01	1	29.065	285	88.46	38
17.3	27.577	175	78.00	28	28.780	281	88.84	12
27.2	27.402	161	77.72	54	28.499	268	88.72	62
Nov. 6.2	27.241	139	77,18	79	28.231	244	88.10	112
16.2	27.102	110	76.39	103	27.987	210	86.98	160
26.1	26.992	78	75.36	126	27.777	171	85.38	205
Dec. 6.1	26.914	40	74.10	143	27.606	124	83.33	243
16.1	26.874	2	72.67	158	27.482	74	80.90	274
26.1	26.872	37	71.09	168	27.408	21	78.16	296
36.0	26.909		69.41		27.387		75.20	
Mean Place	24.521		53.79		26.649		56.65	
Sec δ, Tan δ	1.017		+0.184		1.413		+0.998	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.06		−0.01		+0.04		−0.03	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.2		−0.9		+0.2		−0.9	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ι Sagittarii. Mag. 4.2				ε Pavonis. Mag. 4.1				β Aquilæ. Mag. 3.9				γ Sagittæ. Mag. 3.7			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 19 49		° ′ −42 4		h m 19 51		° ′ −73 7		h m 19 51		° ′ + 6 12		h m 19 55		° ′ +19 16	
	s		″		s		″		s		″		s		″	
Jan. 1.1	40.059	87	55.36	147	12.24	9	33.68	305	19.777	58	18.20	145	8.844	42	23.85	207
11.0	40.146	137	53.89	154	12.33	22	30.63	310	19.835	94	16.75	143	8.886	80	21.78	210
21.0	40.283	183	52.35	157	12.55	36	27.53	305	19.929	128	15.32	136	8.966	117	19.68	202
31.0	40.466	224	50.78	157	12.91	48	24.48	296	20.057	159	13.96	120	9.083	151	17.66	187
Feb. 9.9	40.690	260	49.21	155	13.39	58	21.52	279	20.216	186	12.76	102	9.234	182	15.79	163
19.9	40.950	293	47.66	150	13.97	67	18.73	255	20.402	213	11.74	74	9.416	211	14.16	131
Mar. 1.9	41.243	319	46.16	145	14.64	74	16.18	228	20.615	234	11.00	45	9.627	236	12.85	94
11.9	41.562	344	44.71	136	15.38	81	13.90	195	20.849	255	10.55	10	9.863	258	11.91	50
21.8	41.906	362	43.35	126	16.19	86	11.95	159	21.104	270	10.45	25	10.121	277	11.41	6
31.8	42.268	377	42.09	113	17.05	89	10.36	121	21.374	282	10.70	61	10.398	290	11.35	41
Apr. 10.8	42.645	385	40.96	99	17.94	90	9.15	80	21.656	291	11.31	94	10.688	298	11.76	85
20.7	43.030	390	39.97	82	18.84	91	8.35	38	21.947	294	12.25	125	10.986	302	12.61	128
30.7	43.420	386	39.15	61	19.75	89	7.97	4	22.241	292	13.50	150	11.288	299	13.89	165
May 10.7	43.806	375	38.54	41	20.64	85	8.01	47	22.533	283	15.00	173	11.587	289	15.54	196
20.7	44.181	357	38.13	17	21.49	80	8.48	89	22.816	269	16.73	188	11.876	273	17.50	222
30.6	44.538	331	37.96	6	22.29	73	9.37	127	23.085	246	18.61	197	12.149	250	19.72	241
June 9.6	44.869	295	38.02	31	23.02	64	10.64	163	23.331	220	20.58	201	12.399	221	22.13	253
19.6	45.164	254	38.33	52	23.66	52	12.27	194	23.551	188	22.59	201	12.620	187	24.66	258
29.6	45.418	206	38.85	75	24.18	41	14.21	221	23.739	150	24.60	193	12.807	147	27.24	255
July 9.5	45.624	151	39.60	92	24.59	29	16.42	239	23.889	108	26.53	183	12.954	103	29.79	249
19.5	45.775	93	40.52	107	24.88	14	18.81	251	23.997	65	28.36	168	13.057	59	32.28	236
29.5	45.868	33	41.59	119	25.02	1	21.32	255	24.062	20	30.04	151	13.116	13	34.64	217
Aug. 8.4	45.901	24	42.78	122	25.01	14	23.87	249	24.082	23	31.55	131	13.129	32	36.81	196
18.4	45.877	80	44.00	123	24.87	27	26.36	235	24.059	64	32.86	109	13.097	74	38.77	170
28.4	45.797	131	45.23	116	24.60	41	28.71	210	23.995	100	33.95	88	13.023	112	40.47	144
Sept. 7.4	45.666	174	46.39	104	24.19	50	30.81	178	23.895	132	34.83	63	12.911	143	41.91	113
17.3	45.492	207	47.43	89	23.69	59	32.59	138	23.763	154	35.46	41	12.768	168	43.04	81
27.3	45.285	228	48.32	66	23.10	65	33.97	92	23.609	169	35.87	18	12.600	183	43.85	50
Oct. 7.3	45.057	236	48.98	41	22.45	67	34.89	41	23.440	175	36.05	4	12.417	190	44.35	15
17.3	44.821	233	49.39	14	21.78	68	35.30	12	23.265	171	36.01	28	12.227	187	44.50	18
27.2	44.588	215	49.53	15	21.10	64	35.18	67	23.094	157	35.73	48	12.040	176	44.32	51
Nov. 6.2	44.373	187	49.38	42	20.46	59	34.51	119	22.937	138	35.25	71	11.864	155	43.81	85
16.2	44.186	149	48.96	69	19.87	50	33.32	168	22.799	110	34.54	90	11.709	129	42.96	117
26.1	44.037	104	48.27	91	19.37	39	31.64	212	22.689	79	33.64	108	11.580	98	41.79	145
Dec. 6.1	43.933	53	47.36	113	18.98	27	29.52	247	22.610	43	32.56	125	11.482	62	40.34	171
16.1	43.880	0	46.23	127	18.71	13	27.05	275	22.567	5	31.31	137	11.420	23	38.63	190
26.1	43.880	53	44.96	140	18.58	1	24.30	295	22.562	33	29.94	144	11.397	16	36.73	206
36.0	43.933		43.56		18.57		21.35		22.595		28.50		11.413		34.67	
Mean Place	40.496		56.15		14.672		33.22		20.069		12.83		9.266		16.80	
Sec δ, Tan δ	1.347		−0.903		3.444		−3.296		1.006		+0.109		1.059		+0.350	
$D_\psi\alpha$, $D_\omega\alpha$	+0.08		+0.03		+0.14		+0.10		+0.06		0.00		+0.05		−0.01	
$D_\psi\delta$, $D_\omega\delta$	+0.2		−0.9		+0.2		−0.9		+0.2		−0.9		+0.2		−0.9	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	κ Cephei. Mag. 4.4 Right Ascension.		κ Cephei. Declination.		24 Vulpeculae. Mag. 5.4 Right Ascension.		24 Vulpeculae. Declination.		α^2 Capricorni. Mag. 3.8 Right Ascension.		α^2 Capricorni. Declination.		β Capricorni. Mag. 3.2 Right Ascension.		β Capricorni. Declination.	
	h m 20 11		° ′ +77 27		h m 20 13		° ′ +24 25		h m 20 13		° ′ −12 47		h m 20 16		° ′ −15 1	
	s		″		s		″		s		″		s		″	
Jan. 1.1	32.71		79.12		18.699		23.60		33.526		45.21		27.573		74.04	
11.0	32.36	35	76.04	308	18.718	19	21.37	223	33.575	49	45.49	28	27.621	48	74.18	14
21.0	32.18	18	72.76	328	18.775	57	19.09	228	33.661	86	45.71	22	27.704	83	74.26	8
31.0	32.21	3	69.42	334	18.869	94	16.85	224	33.780	119	45.86	15	27.822	118	74.25	1
Feb. 10.0	32.42	21	66.13	329	19.001	132	14.76	209	33.930	150	45.90	4	27.971	149	74.15	10
19.9	32.81	39	63.04	309	19.167	166	12.88	188	34.108	178	45.81	9	28.149	178	73.91	24
Mar. 1.9	33.38	57	60.24	280	19.365	198	11.32	156	34.313	205	45.55	26	28.354	205	73.54	37
11.9	34.10	72	57.88	236	19.591	226	10.15	117	34.543	230	45.12	43	28.583	229	72.99	55
21.8	34.94	84	56.04	184	19.845	254	9.41	74	34.794	251	44.50	62	28.835	252	72.28	71
31.8	35.89	95	54.77	127	20.119	274	9.15	26	35.064	270	43.71	79	29.106	271	71.42	86
Apr. 10.8	36.90	101	54.12	65	20.411	292	9.38	23	35.349	285	42.74	97	29.393	287	70.40	102
20.8	37.94	104	54.13	1	20.716	305	10.09	71	35.647	298	41.61	113	29.692	299	69.24	116
30.7	38.97	103	54.76	63	21.026	310	11.27	118	35.953	306	40.37	124	30.000	308	67.99	125
May 10.7	39.96	99	56.00	124	21.336	310	12.87	160	36.260	307	39.03	134	30.309	309	66.68	131
20.7	40.88	92	57.80	180	21.637	301	14.84	197	36.562	302	37.65	138	30.615	306	65.34	134
30.7	41.71	83	60.11	231	21.925	288	17.10	226	36.854	292	36.28	137	30.911	296	64.01	133
June 9.6	42.43	72	62.84	273	22.190	265	19.61	251	37.129	275	34.95	133	31.190	279	62.75	126
19.6	43.01	58	65.92	308	22.428	238	22.28	267	37.379	250	33.69	126	31.444	254	61.59	116
29.6	43.42	41	69.26	334	22.631	203	25.03	275	37.598	219	32.56	113	31.668	224	60.54	105
July 9.5	43.68	26	72.79	353	22.793	162	27.81	278	37.781	183	31.55	101	31.858	190	59.66	88
19.5	43.78	10	76.40	361	22.913	120	30.55	274	37.923	142	30.70	85	32.005	147	58.93	73
29.5	43.69	9	80.02	362	22.985	72	33.17	262	38.021	98	30.04	66	32.107	102	58.37	56
Aug. 8.5	43.45	24	83.56	354	23.011	26	35.64	247	38.073	52	29.54	50	32.163	56	58.00	37
18.4	43.04	41	86.96	340	22.991	20	37.90	226	38.079	6	29.20	34	32.172	9	57.80	20
28.4	42.47	57	90.15	319	22.926	65	39.90	200	38.040	39	29.02	18	32.136	36	57.74	6
Sept. 7.4	41.78	69	93.04	289	22.821	105	41.62	172	37.961	79	28.98	4	32.059	77	57.80	6
17.4	40.97	81	95.58	254	22.682	139	43.04	142	37.848	113	29.05	7	31.947	112	57.97	17
27.3	40.06	91	97.72	214	22.516	166	44.12	108	37.708	140	29.21	16	31.807	140	58.23	26
Oct. 7.3	39.07	99	99.41	169	22.331	185	44.84	72	37.548	160	29.46	25	31.647	160	58.53	30
17.3	38.03	104	100.60	119	22.137	194	45.20	36	37.379	169	29.75	29	31.478	169	58.87	34
27.2	36.96	107	101.26	66	21.942	195	45.19	1	37.211	168	30.07	32	31.308	170	59.21	34
Nov. 6.2	35.90	106	101.36	10	21.754	188	44.80	39	37.053	158	30.42	35	31.148	160	59.55	34
16.2	34.87	103	100.88	48	21.584	170	44.03	77	36.912	141	30.77	35	31.004	144	59.87	32
26.2	33.90	97	99.84	104	21.437	147	42.90	113	36.797	115	31.14	37	30.887	117	60.18	31
Dec. 6.1	33.01	89	98.25	159	21.319	118	41.45	145	36.712	85	31.50	36	30.799	88	60.46	28
16.1	32.24	77	96.14	211	21.235	84	39.69	176	36.661	51	31.87	37	30.747	52	60.72	26
26.1	31.61	63	93.59	255	21.187	48	37.70	199	36.648	13	32.22	35	30.731	16	60.95	23
36.1	31.15	46	90.66	293	21.180	7	35.52	218	36.672	24	32.54	32	30.753	22	61.14	19
Mean Place	38.590		65.02		19.143		15.00		33.706		48.47		27.746		77.00	
Sec δ, Tan δ	4.610		+4.500		1.098		+0.454		1.025		−0.227		1.035		−0.289	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	−0.04		−0.16		+0.05		−0.02		+0.07		+0.01		+0.07		+0.01	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.2		−0.8		+0.2		−0.8		+0.2		−0.8		+0.2		−0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	41 Cygni. Mag. 4.1				θ Cephei. Mag. 4.3				ε Delphini. Mag. 4.0				Groombridge 3241. Mag. 6.4			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 20 26		° ′ +30 5		h m 20 28		° ′ +62 43		h m 20 29		° ′ +11 1		h m 20 30		° ′ +72 15	
	s		″		s		″		s		″		s		″	
Jan. 1.1	4.707	4	61.43	238	11.51	14	31.84	303	20.379	19	44.82	156	18.45	27	41.91	300
11.0	4.703	37	59.05	247	11.37	5	28.81	322	20.398	55	43.26	158	18.18	14	38.91	322
21.0	4.740	78	56.58	246	11.32	3	25.59	331	20.453	85	41.68	153	18.04	2	35.69	334
31.0	4.818	117	54.12	234	11.35	11	22.28	325	20.538	120	40.15	140	18.02	12	32.35	331
Feb. 10.0	4.935	154	51.78	212	11.46	20	19.03	307	20.658	151	38.75	121	18.14	26	29.04	316
19.9	5.089	190	49.66	183	11.66	29	15.96	277	20.809	179	37.54	96	18.40	37	25.88	289
Mar. 1.9	5.279	223	47.83	144	11.95	34	13.19	236	20.988	208	36.58	63	18.77	48	22.99	249
11.9	5.502	252	46.39	98	12.29	41	10.83	185	21.196	231	35.95	29	19.25	58	20.50	200
21.9	5.754	277	45.41	49	12.70	47	8.98	126	21.427	255	35.66	9	19.83	67	18.50	143
31.8	6.031	299	44.92	4	13.17	49	7.72	65	21.682	272	35.75	47	20.50	72	17.07	82
Apr. 10.8	6.330	313	44.96	56	13.66	53	7.07	1	21.954	287	36.22	86	21.22	75	16.25	19
20.8	6.643	321	45.52	105	14.19	53	7.06	62	22.241	296	37.08	121	21.97	76	16.06	46
30.7	6.964	322	46.57	152	14.72	53	7.68	124	22.537	300	38.29	153	22.73	75	16.52	108
May 10.7	7.286	317	48.09	195	15.25	50	8.92	180	22.837	297	39.82	179	23.48	71	17.60	166
20.7	7.603	301	50.04	228	15.75	47	10.72	231	23.134	287	41.61	201	24.19	65	19.26	218
30.7	7.904	281	52.32	258	16.22	42	13.03	274	23.421	270	43.62	215	24.84	58	21.44	264
June 9.6	8.185	252	54.90	278	16.64	36	15.77	310	23.691	246	45.77	224	25.42	49	24.08	301
19.6	8.437	216	57.68	292	17.00	30	18.87	335	23.937	216	48.01	227	25.91	39	27.09	331
29.6	8.653	176	60.60	297	17.30	21	22.22	355	24.153	181	50.28	224	26.30	27	30.40	352
July 9.6	8.829	131	63.57	298	17.51	13	25.77	364	24.334	142	52.52	217	26.57	16	33.92	364
19.5	8.960	83	66.55	288	17.64	6	29.41	366	24.476	97	54.69	203	26.73	3	37.56	368
29.5	9.043	34	69.43	274	17.70	3	33.07	358	24.573	53	56.72	187	26.76	9	41.24	364
Aug. 8.5	9.077	15	72.17	254	17.67	11	36.65	343	24.626	8	58.59	166	26.67	21	44.88	350
18.4	9.062	61	74.71	230	17.56	20	40.08	322	24.634	35	60.25	145	26.46	32	48.38	332
28.4	9.001	104	77.01	201	17.36	26	43.30	292	24.599	75	61.70	120	26.14	42	51.70	305
Sept. 7.4	8.897	139	79.02	169	17.10	33	46.22	258	24.524	109	62.90	96	25.72	51	54.75	272
17.4	8.758	170	80.71	133	16.77	37	48.80	217	24.415	136	63.86	70	25.21	59	57.47	235
27.3	8.588	191	82.04	97	16.40	42	50.97	172	24.279	156	64.56	44	24.62	66	59.82	188
Oct. 7.3	8.397	204	83.01	56	15.98	44	52.69	123	24.123	168	65.00	16	23.96	70	61.70	139
17.3	8.193	207	83.57	16	15.54	46	53.92	70	23.955	171	65.16	9	23.26	72	63.09	88
27.3	7.986	202	83.73	26	15.08	46	54.62	14	23.784	163	65.07	36	22.54	73	63.97	31
Nov. 6.2	7.784	188	83.47	67	14.62	45	54.76	42	23.621	150	64.71	62	21.81	71	64.28	26
16.2	7.596	166	82.80	108	14.17	41	54.34	100	23.471	130	64.09	84	21.10	68	64.02	84
26.2	7.430	139	81.72	144	13.76	37	53.34	154	23.341	103	63.25	108	20.42	62	63.18	142
Dec. 6.1	7.291	105	80.28	180	13.39	33	51.80	205	23.238	73	62.17	127	19.80	54	61.76	195
16.1	7.186	69	78.48	209	13.06	26	49.75	251	23.165	41	60.90	142	19.26	45	59.81	241
26.1	7.117	30	76.39	231	12.80	18	47.24	286	23.124	6	59.48	154	18.81	35	57.40	283
36.1	7.087		74.08		12.62		44.38		23.118		57.94		18.46		54.57	
Mean Place	5.201		51.33		13.538		17.36		20.610		37.66		22.041		26.42	
Sec δ, Tan δ	1.156		+0.580		2.182		+1.940		1.019		+0.195		3.283		+3.128	
$D_\psi\alpha$, $D_\omega\alpha$	+0.05		−0.02		+0.02		−0.08		+0.06		−0.01		0.00		−0.13	
$D_\psi\delta$, $D_\omega\delta$	+0.2		−0.8		+0.2		−0.8		+0.2		−0.8		+0.2		−0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

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hington n Time.	μ Aquarii. Mag. 4.8				β Indi. Mag. 3.7				32 Vulpeculae. Mag. 5.2				220 H[1]. Draconis. Mag. 5.6			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 20 48		° ′ − 9 16		h m 20 48		° ′ −58 45		h m 20 51		° ′ +27 44		h m 20 51		° ′ +80 14	
	s		″		s		″		s		″		s		″	
n. 1.1	17.089		73.60		28.530		41.27		6.109		67.12		11.73		75.41	
11.1	17.104	15	74.03	43	28.509	21	38.96	231	6.086	23	64.94	218	11.05	68	72.66	275
21.0	17.152	48	74.41	38	28.558	49	36.44	252	6.101	15	62.65	229	10.59	46	69.63	303
31.0	17.233	81	74.68	27	28.674	116	33.81	263	6.153	52	60.36	229	10.38	21	66.39	324
b. 10.0	17.345	112	74.85	17	28.854	180	31.12	269	6.242	89	58.14	222	10.41	3	63.10	329
20.0	17.487	142	74.86	1	29.096	242	28.42	270	6.370	128	56.11	203	10.70	29	59.87	323
ar. 1.9	17.657	170	74.69	17	29.394	298	25.77	265	6.533	163	54.34	177	11.20	50	56.85	302
11.9	17.855	198	74.32	37	29.744	350	23.23	254	6.731	198	52.91	143	11.93	73	54.15	270
21.9	18.078	223	73.74	58	30.140	396	20.83	240	6.960	229	51.91	100	12.86	93	51.87	228
31.8	18.325	247	72.93	81	30.577	437	18.64	219	7.219	259	51.36	55	13.94	108	50.11	176
pr. 10.8	18.592	267	71.93	100	31.047	470	16.67	197	7.502	283	51.31	5	15.15	121	48.93	118
20.8	18.876	284	70.72	121	31.547	500	14.98	169	7.804	302	51.76	45	16.43	128	48.36	57
30.8	19.173	297	69.36	136	32.064	517	13.61	137	8.119	315	52.69	93	17.74	131	48.43	7
ay 10.7	19.479	306	67.87	149	32.591	527	12.58	103	8.440	321	54.08	139	19.05	131	49.10	67
20.7	19.784	305	66.30	157	33.118	527	11.92	66	8.760	320	55.88	180	20.30	125	50.35	125
30.7	20.084	300	64.69	161	33.632	514	11.65	27	9.070	310	58.04	216	21.45	115	52.20	185
ne 9.7	20.372	288	63.10	159	34.122	490	11.76	11	9.364	294	60.48	244	22.49	104	54.50	230
19.6	20.640	268	61.56	154	34.576	454	12.25	49	9.633	269	63.15	267	23.39	90	57.26	276
29.6	20.881	241	60.12	144	34.983	407	13.12	87	9.872	239	65.95	280	24.09	70	60.36	310
ly 9.6	21.090	209	58.81	131	35.332	349	14.34	122	10.071	199	68.84	289	24.62	53	63.69	333
19.5	21.260	170	57.67	114	35.612	280	15.86	152	10.229	158	71.73	289	24.93	31	67.23	354
29.5	21.387	127	56.71	96	35.818	206	17.63	177	10.341	112	74.56	283	25.04	11	70.89	366
ug. 8.5	21.470	83	55.94	77	35.943	125	19.59	196	10.404	63	77.27	271	24.94	10	74.56	367
18.5	21.507	37	55.36	58	35.984	41	21.68	209	10.420	16	79.80	253	24.62	32	78.17	361
28.4	21.499	8	54.97	39	35.944	40	23.80	212	10.389	31	82.11	231	24.11	51	81.63	346
pt. 7.4	21.450	49	54.77	20	35.825	119	25.88	208	10.314	75	84.16	205	23.40	71	84.91	328
17.4	21.363	87	54.71	6	35.633	192	27.84	196	10.201	113	85.90	174	22.53	87	87.89	298
27.4	21.245	118	54.79	8	35.381	252	29.57	173	10.057	144	87.33	143	21.52	101	90.54	265
t. 7.3	21.105	140	55.00	21	35.081	300	31.04	147	9.887	170	88.40	107	20.37	115	92.80	226
17.3	20.950	155	55.29	29	34.748	333	32.14	110	9.703	184	89.10	70	19.13	124	94.60	180
27.3	20.789	161	55.65	36	34.400	348	32.82	68	9.510	193	89.41	31	17.82	131	95.90	130
v. 6.2	20.632	157	56.07	42	34.051	349	33.08	26	9.319	191	89.33	8	16.47	135	96.68	78
16.2	20.487	145	56.52	45	33.720	331	32.87	21	9.137	182	88.86	47	15.13	134	96.87	19
26.2	20.361	126	57.01	49	33.421	299	32.21	66	8.972	165	88.00	86	13.82	131	96.46	41
c. 6.2	20.259	102	57.52	51	33.168	253	31.12	109	8.829	143	86.77	123	12.58	124	95.47	99
16.1	20.186	73	58.03	51	32.970	198	29.62	150	8.715	114	85.19	158	11.46	112	93.94	153
26.1	20.144	42	58.53	50	32.836	134	27.78	184	8.632	83	83.34	185	10.48	98	91.85	209
36.1	20.136	8	59.01	48	32.768	68	25.64	214	8.583	49	81.25	209	9.67	81	89.33	252
Place	17.181		77.40		29.396		38.12		6.450		56.14		18.445		57.55	
, Tan δ	1.013		−0.164		1.928		−1.648		1.130		+0.526		5.907		+5.822	
$D_{\omega\alpha}$	+0.06		+0.01		+0.09		+0.07		+0.05		−0.02		−0.05		−0.28	
$D_{\omega\delta}$	+0.3		−0.7		+0.3		−0.7		+0.3		−0.7		+0.3		−0.7	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ν Cygni. Mag. 4.0 Right Ascension.		ν Cygni. Declination.		α Octantis. Mag. 5.2 Right Ascension.		α Octantis. Declination.		γ Microscopii. Mag. 4.7 Right Ascension.		γ Microscopii. Declination.		θ Capricorni. Mag. 4.2 Right Ascension.		θ Capricorni. Declination.
	h m		° ′		h m		° ′		h m		° ′		h m		°
	20 54		+40 51		20 54		−77 19		20 56		−32 34		21 1		−17
	s		″		s		″		s		″		s		″
Jan. 1.1	8.561		30.21		53.84		68.94		19.449		31.03		23.684		77.99
11.1	8.503	58	27.66	255	53.63	21	65.88	306	19.455	6	30.14	89	23.688	4	77.96
21.0	8.491	12	24.95	271	53.61	2	62.62	326	19.500	45	29.09	105	23.727	39	77.82
31.0	8.524	33	22.17	278	53.74	13	59.23	339	19.585	85	27.90	119	23.799	72	77.55
Feb. 10.0	8.604	80	19.43	274	54.04	30	55.81	342	19.706	121	26.60	130	23.902	103	77.17
20.0	8.730	126	16.87	256	54.50	46	52.45	336	19.863	157	25.19	141	24.036	134	76.65
Mar. 1.9	8.901	171	14.55	232	55.09	59	49.21	324	20.052	189	23.70	149	24.201	165	75.96
11.9	9.115	214	12.61	194	55.83	74	46.16	305	20.274	222	22.14	156	24.394	193	75.13
21.9	9.368	253	11.11	150	56.67	84	43.36	280	20.526	252	20.53	161	24.615	221	74.14
31.9	9.656	288	10.13	98	57.62	95	40.89	247	20.804	278	18.89	164	24.862	247	72.98
Apr. 10.8	9.973	317	9.70	43	58.65	103	38.77	212	21.107	303	17.27	162	25.131	269	71.70
20.8	10.312	339	9.83	13	59.73	108	37.05	172	21.430	323	15.67	160	25.419	288	70.30
30.8	10.666	354	10.52	69	60.85	112	35.77	128	21.768	338	14.15	152	25.724	305	68.82
May 10.7	11.025	359	11.75	123	61.99	114	34.94	83	22.118	350	12.73	142	26.037	313	67.30
20.7	11.382	357	13.48	173	63.12	113	34.61	33	22.468	350	11.46	127	26.354	317	65.78
30.7	11.726	344	15.65	217	64.22	110	34.74	13	22.815	347	10.38	108	26.669	315	64.30
June 9.7	12.049	323	18.20	255	65.27	105	35.35	61	23.149	334	9.50	88	26.971	302	62.90
19.6	12.342	293	21.05	285	66.22	95	36.42	107	23.462	313	8.86	64	27.256	285	61.62
29.6	12.598	256	24.13	308	67.08	86	37.92	150	23.747	285	8.47	39	27.516	260	60.51
July 9.6	12.810	212	27.35	322	67.81	73	39.80	188	23.993	246	8.35	12	27.743	227	59.58
19.5	12.974	164	30.63	328	68.38	57	42.02	222	24.198	205	8.48	13	27.932	189	58.86
29.5	13.086	112	33.91	328	68.78	40	44.50	248	24.355	157	8.84	36	28.078	146	58.34
Aug. 8.5	13.143	57	37.11	320	69.01	23	47.16	266	24.461	106	9.42	58	28.178	100	58.04
18.5	13.146	3	40.14	303	69.06	5	49.91	275	24.513	52	10.21	79	28.231	53	57.93
28.4	13.095	51	42.99	285	68.91	15	52.65	274	24.511	2	11.11	90	28.237	6	58.01
Sept. 7.4	12.996	99	45.55	256	68.58	33	55.28	263	24.460	51	12.11	100	28.198	39	58.24
17.4	12.855	141	47.81	226	68.08	50	57.70	242	24.365	95	13.15	104	28.119	79	58.59
27.4	12.677	178	49.71	190	67.45	63	59.81	211	24.231	134	14.17	102	28.007	112	59.05
Oct. 7.3	12.469	208	51.21	150	66.69	76	61.52	171	24.067	164	15.13	96	27.870	137	59.56
17.3	12.243	226	52.28	107	65.84	85	62.76	124	23.884	183	15.97	84	27.715	155	60.08
27.3	12.006	237	52.89	61	64.94	90	63.47	71	23.692	192	16.63	66	27.552	163	60.61
Nov. 6.2	11.768	238	53.03	14	64.02	92	63.61	14	23.501	191	17.12	49	27.390	162	61.10
16.2	11.537	231	52.69	34	63.12	90	63.15	46	23.322	179	17.39	27	27.237	153	61.53
26.2	11.324	213	51.87	82	62.28	84	62.13	102	23.164	158	17.44	5	27.101	136	61.91
Dec. 6.2	11.133	191	50.59	128	61.54	74	60.54	159	23.034	130	17.26	18	26.990	111	62.21
16.1	10.973	160	48.87	172	60.92	62	58.46	208	22.936	98	16.88	38	26.908	82	62.41
26.1	10.848	125	46.76	211	60.46	46	55.95	251	22.876	60	16.29	59	26.855	53	62.55
36.1	10.762	86	44.36	240	60.14	32	53.10	285	22.855	21	15.51	78	26.837	18	62.59
Mean Place	9.161		16.75		57.160		64.53		19.631		30.68		23.751		80.16
Sec δ, Tan δ	1.322		+0.865		4.560		−4.449		1.187		−0.639		1.049		−0.316
$D_\psi a$, $D_\omega a$	+0.04		−0.04		+0.15		+0.20		+0.07		+0.03		+0.07		+0.02
$D_\psi \delta$, $D_\omega \delta$	+0.3		−0.7		+0.3		−0.7		+0.3		−0.7		+0.3		−0.7

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ξ Cygni. Mag. 3.9 Right Ascension.		ξ Cygni. Declination.		61 Cygni pr. Mag. 5.6 Right Ascension.		61 Cygni pr. Declination.		ν Aquarii. Mag. 4.5 Right Ascension.		ν Aquarii. Declination.		Bradley 2777. Mag. 5.9 Right Ascension.		Bradley 2777. Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	21 1		+43 36		21 3		+38 20		21 5		−11 41		21 7		+77 47	
	s		″		s		″		s		″		s		″	
Jan. 1.1	58.409		29.65		15.343		74.68		10.944		57.77		4.14		72.39	
11.1	58.335	74	27.10	255	15.297	46	72.34	234	10.944	0	58.06	29	3.58	56	69.75	264
21.0	58.307	28	24.36	274	15.294	3	69.83	251	10.977	33	58.25	19	3.17	41	66.78	297
31.0	58.326	19	21.53	283	15.333	39	67.25	258	11.042	65	58.36	11	2.94	23	63.59	319
Feb. 10.0	58.395	69	18.72	281	15.418	85	64.72	253	11.137	95	58.33	3	2.92	2	60.30	329
20.0	58.512	117	16.06	266	15.546	128	62.33	239	11.264	127	58.15	18	3.09	17	57.05	325
Mar. 1.9	58.677	165	13.63	243	15.717	171	60.21	212	11.420	156	57.80	35	3.45	36	53.96	309
11.9	58.887	210	11.57	206	15.930	213	58.44	177	11.604	184	57.26	54	3.99	54	51.16	280
21.9	59.141	254	9.94	163	16.181	251	57.11	133	11.816	212	56.51	75	4.69	70	48.76	240
31.9	59.432	291	8.81	113	16.466	285	56.27	84	12.054	238	55.57	94	5.54	85	46.86	190
Apr. 10.8	59.754	322	8.23	58	16.781	315	55.96	31	12.315	261	54.43	114	6.48	94	45.52	134
20.8	60.102	348	8.24	1	17.118	337	56.20	24	12.595	280	53.13	130	7.50	102	44.77	75
30.8	60.466	364	8.81	57	17.472	354	56.99	79	12.891	296	51.69	144	8.56	106	44.66	11
May 10.7	60.837	371	9.93	112	17.832	360	58.31	132	13.198	307	50.14	155	9.63	107	45.18	52
20.7	61.207	370	11.57	164	18.191	359	60.11	180	13.508	310	48.54	160	10.67	104	46.30	112
30.7	61.565	358	13.68	211	18.539	348	62.35	224	13.815	307	46.92	162	11.66	99	47.98	168
June 9.7	61.903	338	16.19	251	18.869	330	64.95	260	14.113	298	45.34	158	12.56	90	50.18	220
19.6	62.210	307	19.02	283	19.171	302	67.84	289	14.392	279	43.83	151	13.34	78	52.82	264
29.6	62.480	270	22.11	309	19.438	267	70.96	312	14.647	255	42.43	140	14.00	66	55.84	302
July 9.6	62.705	225	25.35	324	19.664	226	74.20	324	14.870	223	41.20	123	14.51	51	59.14	330
19.6	62.880	175	28.69	334	19.843	179	77.51	331	15.057	187	40.13	107	14.85	34	62.67	353
29.5	63.002	122	32.05	336	19.971	128	80.81	330	15.202	145	39.27	86	15.03	18	66.32	365
Aug. 8.5	63.068	66	35.34	329	20.047	76	84.02	321	15.302	100	38.61	66	15.05	2	70.03	371
18.5	63.077	9	38.50	316	20.071	24	87.08	306	15.355	53	38.15	46	14.88	17	73.71	368
28.4	63.031	46	41.45	295	20.043	28	89.94	286	15.364	9	37.89	26	14.56	32	77.27	356
Sept. 7.4	62.934	97	44.17	272	19.968	75	92.53	259	15.329	35	37.80	9	14.09	47	80.67	340
17.4	62.793	141	46.57	240	19.850	118	94.83	230	15.255	74	37.87	7	13.46	63	83.80	313
27.4	62.612	181	48.61	204	19.696	154	96.76	193	15.149	106	38.08	21	12.72	74	86.63	283
Oct. 7.3	62.399	213	50.26	165	19.514	182	98.31	155	15.018	131	38.38	30	11.87	85	89.06	243
17.3	62.166	233	51.47	121	19.312	202	99.44	113	14.870	148	38.76	38	10.93	94	91.05	199
27.3	61.919	247	52.22	75	19.098	214	100.14	70	14.713	157	39.20	44	9.93	100	92.56	151
Nov. 6.3	61.669	250	52.49	27	18.884	214	100.38	24	14.557	156	39.66	46	8.89	104	93.52	96
16.2	61.425	244	52.27	22	18.677	207	100.15	23	14.409	148	40.14	48	7.85	104	93.90	38
26.2	61.195	230	51.55	72	18.483	194	99.46	69	14.278	131	40.61	47	6.81	104	93.70	20
Dec. 6.2	60.989	206	50.35	120	18.313	170	98.32	114	14.169	109	41.07	46	5.83	98	92.91	79
16.1	60.812	177	48.69	166	18.170	143	96.77	155	14.086	83	41.50	43	4.92	91	91.52	139
26.1	60.668	144	46.62	207	18.060	110	94.86	191	14.032	54	41.90	40	4.12	80	89.60	192
36.1	60.565	103	44.23	239	17.988	72	92.63	223	14.010	22	42.25	35	3.45	67	87.22	238
Mean Place	59.037		15.27		15.836		61.37		10.986		61.06		8.907		53.39	
Sec δ, Tan δ	1.381		+0.953		1.275		+0.791		1.021		−0.207		4.733		+4.827	
$D_\psi\alpha$, $D_\omega\alpha$	+0.04		−0.05		+0.05		−0.04		+0.06		+0.01		−0.02		−0.22	
$D_\psi\delta$, $D_\omega\delta$	+0.3		−0.7		+0.3		−0.7		+0.3		−0.7		+0.3		−0.7	

FOR THE UPPER TRANSIT AT

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	σ Cygni. Mag. 4.3 Right Ascension.		σ Cygni. Declination.		θ¹ Microscopii. Mag. 4.9 Right Ascension.		θ¹ Microscopii. Declination.	
	h m 21 14		° ′ +39 3		h m 21 15		° ′ −41 8	
	s		″		s		″	
Jan. 1.1	13.583	70	31.43	236	34.731	23	72.13	132
11.1	13.513	30	29.07	257	34.708	19	70.81	154
21.1	13.483	12	26.50	265	34.727	62	69.27	171
31.0	13.495	56	23.85	263	34.789	103	67.56	185
Feb. 10.0	13.551	101	21.22	251	34.892	145	65.71	195
20.0	13.652	146	18.71	229	35.037	182	63.76	203
Mar. 1.9	13.798	188	16.42	195	35.219	221	61.73	207
11.9	13.986	229	14.47	154	35.440	256	59.66	207
21.9	14.215	267	12.93	107	35.696	288	57.59	205
31.9	14.482	299	11.86	54	35.984	318	55.54	197
Apr. 10.8	14.781	323	11.32	2	36.302	343	53.57	187
20.8	15.104	343	11.34	55	36.645	363	51.70	173
30.8	15.447	354	11.89	109	37.008	378	49.97	153
May 10.8	15.801	355	12.98	158	37.386	385	48.44	131
20.7	16.156	346	14.56	203	37.771	383	47.13	105
30.7	16.502	332	16.59	241	38.154	373	46.08	76
June 9.7	16.834	305	19.00	272	38.527	353	45.32	46
19.6	17.139	273	21.72	298	38.880	326	44.86	14
29.6	17.412	233	24.70	312	39.206	286	44.72	18
July 9.6	17.645	187	27.82	321	39.492	242	44.90	48
19.6	17.832	136	31.03	324	39.734	194	45.38	77
29.5	17.968	85	34.27	317	39.928	134	46.15	101
Aug. 8.5	18.053	31	37.44	303	40.062	77	47.16	123
18.5	18.084	20	40.47	286	40.139	18	48.39	137
28.5	18.064	70	43.33	261	40.157	39	49.76	146
Sept. 7.4	17.994	114	45.94	233	40.118	91	51.22	148
17.4	17.880	152	48.27	198	40.027	136	52.70	144
27.4	17.728	182	50.25	160	39.891	174	54.14	132
Oct. 7.3	17.546	205	51.85	120	39.717	199	55.46	113
17.3	17.341	218	53.05	77	39.518	215	56.59	92
27.3	17.123	222	53.82	31	39.303	218	57.51	63
Nov. 6.3	16.901	219	54.13	16	39.085	210	58.14	33
16.2	16.682	207	53.97	62	38.875	193	58.47	2
26.2	16.475	189	53.35	108	38.682	167	58.49	30
Dec. 6.2	16.286	162	52.27	151	38.515	133	58.19	62
16.2	16.124	132	50.76	189	38.382	95	57.57	89
26.1	15.992	95	48.87	222	38.287	54	56.68	115
36.1	15.897		46.65		38.233		55.53	
Mean Place	14.011		17.18		34.975		69.83	
Sec δ, Tan δ	1.288		+0.812		1.328		−0.874	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.05		−0.04		+0.08		+0.04	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.3		−0.7		+0.3		−0.7	

Washington Mean Time.	α Cephei. Mag. 2.6 Right Ascension.		α Cephei. Declination.		ι Capricorni. Mag. 4.3 Right Ascension.		ι Capricorni. Declination.	
	h m 21 16		° ′ +62 14		h m 21 17		° ′ −17 10	
	s		″		s		″	
Jan. 1.1	37.44	21	49.51	263	44.325	11	46.81	2
11.1	37.23	13	46.88	295	44.314	22	46.79	13
21.1	37.10	7	43.93	314	44.336	54	46.66	26
31.0	37.03	2	40.79	320	44.390	86	46.40	40
Feb. 10.0	37.05	10	37.59	315	44.476	117	46.00	54
20.0	37.15	19	34.44	295	44.593	147	45.46	71
Mar. 1.9	37.34	26	31.49	265	44.740	177	44.75	87
11.9	37.60	34	28.84	224	44.917	207	43.88	104
21.9	37.94	40	26.60	174	45.124	233	42.84	121
31.9	38.34	45	24.86	118	45.357	259	41.63	135
Apr. 10.8	38.79	50	23.68	58	45.616	280	40.28	147
20.8	39.29	52	23.10	6	45.896	299	38.81	155
30.8	39.81	53	23.16	67	46.195	310	37.26	160
May 10.8	40.34	53	23.83	126	46.505	317	35.66	161
20.7	40.87	51	25.09	181	46.822	317	34.05	158
30.7	41.38	48	26.90	231	47.139	307	32.47	149
June 9.7	41.86	43	29.21	274	47.446	293	30.98	137
19.6	42.29	38	31.95	308	47.739	268	29.61	121
29.6	42.67	31	35.03	336	48.007	240	28.40	102
July 9.6	42.98	23	38.39	355	48.247	202	27.38	81
19.6	43.21	15	41.94	365	48.449	160	26.57	59
29.5	43.36	8	45.59	368	48.609	115	25.98	37
Aug. 8.5	43.44	0	49.27	362	48.724	69	25.61	14
18.5	43.44	8	52.89	349	48.793	21	25.47	4
28.5	43.36	16	56.38	328	48.814	24	25.51	23
Sept. 7.4	43.20	24	59.66	301	48.790	64	25.74	35
17.4	42.96	29	62.67	268	48.726	99	26.09	47
27.4	42.67	33	65.35	228	48.627	127	26.56	54
Oct. 7.3	42.34	38	67.63	184	48.500	147	27.10	57
17.3	41.96	41	69.47	134	48.353	157	27.67	57
27.3	41.55	42	70.81	81	48.196	159	28.24	55
Nov. 6.3	41.13	43	71.62	25	48.037	153	28.79	50
16.2	40.70	41	71.87	33	47.884	138	29.29	43
26.2	40.29	39	71.54	90	47.746	117	29.72	35
Dec. 6.2	39.90	36	70.64	146	47.629	93	30.07	26
16.2	39.54	31	69.18	197	47.536	63	30.33	17
26.1	39.23	25	67.21	242	47.473	32	30.50	9
36.1	38.98		64.79		47.441		30.59	
Mean Place	38.892		31.36		44.339		48.86	
Sec δ, Tan δ	2.148		+1.900		1.047		−0.309	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.03		−0.10		+0.07		+0.02	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.3		−0.7		+0.3		−0.7	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	β Aquarii. Mag. 3.1 Right Ascension. 21h 27m		Declination. −5° 55′	
	s		″	
Jan. 1.1	17.800	20	37.11	56
11.1	17.780	— 11	37.67	52
21.1	17.791	39	38.19	41
31.0	17.830	70	38.60	29
Feb. 10.0	17.900	99	38.89	14 —
20.0	17.999	131	39.03	6
Mar. 2.0	18.130	161	38.97	28
11.9	18.291	189	38.69	51
21.9	18.480	218	38.18	76
31.9	18.698	243	37.42	99
Apr. 10.8	18.941	267	36.43	123
20.8	19.208	285	35.20	142
30.8	19.493	298	33.78	159
May 10.8	19.791	307	32.19	171
20.7	20.098	306	30.48	177
30.7	20.404	299	28.71	180
June 9.7	20.703	285	26.91	177
19.7	20.988	263	25.14	170
29.6	21.251	235	23.44	158
July 9.6	21.486	200	21.86	143
19.6	21.686	160	20.43	124
29.5	21.846	117	19.19	104
Aug. 8.5	21.963	72	18.15	84
18.5	22.035	28	17.31	62
28.5	22.063	— 15	16.69	42
Sept. 7.4	22.048	55	16.27	22
17.4	21.993	87	16.05	5
27.4	21.906	116	16.00	— 11
Oct. 7.4	21.790	134	16.11	25
17.3	21.656	146	16.36	34
27.3	21.510	149	16.70	45
Nov. 6.3	21.361	144	17.15	51
16.2	21.217	133	17.66	56
26.2	21.084	114	18.22	60
Dec. 6.2	20.970	95	18.82	63
16.2	20.875	68	19.45	63
26.1	20.807	41	20.08	62
36.1	20.766		20.70	
Mean Place	17.762		41.62	
Sec δ, Tan δ	1.005		−0.104	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		+0.01	
$D_\psi\delta$, $D_\omega\delta$	+0.3		−0.6	

Washington Mean Time.	β Cephei. Mag. 3.3 Right Ascension. 21h 27m		Declination. +70° 12′	
	s		″	
Jan. 1.1	35.08	34	37.62	252
11.1	34.74	27	35.10	286
21.1	34.47	15	32.24	313
31.0	34.32	4 —	29.11	325
Feb. 10.0	34.28	8	25.86	324
20.0	34.36	20	22.62	310
Mar. 2.0	34.56	31	19.52	285
11.9	34.87	41	16.67	247
21.9	35.28	52	14.20	200
31.9	35.80	58	12.20	147
Apr. 10.8	36.38	64	10.73	85
20.8	37.02	68	9.88	25 —
30.8	37.70	70	9.63	38
May 10.8	38.40	70	10.01	100
20.7	39.10	68	11.01	157
30.7	39.78	63	12.58	209
June 9.7	40.41	57	14.67	256
19.7	40.98	49	17.23	295
29.6	41.47	42	20.18	326
July 9.6	41.89	31	23.44	351
19.6	42.20	21	26.95	365
29.5	42.41	10 —	30.60	373
Aug. 8.5	42.51	1	34.33	372
18.5	42.50	11	38.05	363
28.5	42.39	21	41.68	346
Sept. 7.4	42.18	30	45.14	324
17.4	41.88	41	48.38	293
27.4	41.47	46	51.31	255
Oct. 7.4	41.01	52	53.86	213
17.3	40.49	57	55.99	165
27.3	39.92	59	57.64	113
Nov. 6.3	39.33	61	58.77	55 —
16.2	38.72	61	59.32	5
26.2	38.11	58	59.27	62
Dec. 6.2	37.53	54	58.65	122
16.2	36.99	49	57.43	177
26.1	36.50	40	55.66	227
36.1	36.10		53.39	
Mean Place	37.302		17.78	
Sec δ, Tan δ	2.954		+2.779	
$D_\psi\alpha$, $D_\omega\alpha$	+0.02		−0.15	
$D_\psi\delta$, $D_\omega\delta$	+0.3		−0.6	

Washington Mean Time.	ξ Aquarii. Mag. 4.8 Right Ascension. 21h 33m		Declination. −8° 12′	
	s		″	
Jan. 1.1	26.541	23 —	61.21	45
11.1	26.518	4	61.66	38
21.1	26.522	35	62.04	26
31.0	26.557	66	62.30	14 —
Feb. 10.0	26.623	95	62.44	2
20.0	26.718	125	62.42	21
Mar. 2.0	26.843	156	62.21	41
11.9	26.999	185	61.80	64
21.9	27.184	215	61.16	87
31.9	27.399	241	60.29	109
Apr. 10.8	27.640	264	59.20	129
20.8	27.904	284	57.91	147
30.8	28.188	298	56.44	163
May 10.8	28.486	308	54.81	171
20.7	28.794	309	53.10	177
30.7	29.103	302	51.33	176
June 9.7	29.405	290	49.57	173
19.7	29.695	268	47.84	162
29.6	29.963	241	46.22	150
July 9.6	30.204	207	44.72	133
19.6	30.411	167	43.39	113
29.5	30.578	124	42.26	93
Aug. 8.5	30.702	80	41.33	70
18.5	30.782	34 —	40.63	50
28.5	30.816	9	40.13	28
Sept. 7.4	30.807	47	39.85	10 —
17.4	30.760	84	39.75	6
27.4	30.676	112	39.81	22
Oct. 7.4	30.564	131	40.03	33
17.3	30.433	144	40.36	41
27.3	30.289	148	40.77	48
Nov. 6.3	30.141	144	41.25	53
16.2	29.997	134	41.78	56
26.2	29.863	117	42.34	56
Dec. 6.2	29.746	96	42.90	57
16.2	29.650	71	43.47	54
26.1	29.579	45	44.01	51
36.1	29.534		44.52	
Mean Place	26.480		65.17	
Sec δ, Tan δ	1.010		−0.144	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		+0.01	
$D_\psi\delta$, $D_\omega\delta$	+0.3		−0.6	

Washington Mean Time.	74 Cygni. Mag. 5.1 Right Ascension. 21h 33m		Declination. +40° 2′	
	s		″	
Jan. 1.1	41.782	93	72.13	225
11.1	41.689	53	69.88	247
21.1	41.636	13 —	67.41	261
31.0	41.623	32	64.80	263
Feb. 10.0	41.655	77	62.17	254
20.0	41.732	122	59.63	235
Mar. 2.0	41.854	169	57.28	206
11.9	42.023	212	55.22	167
21.9	42.235	253	53.55	122
31.9	42.488	288	52.33	71
Apr. 10.8	42.776	319	51.62	18 —
20.8	43.095	341	51.44	37
30.8	43.436	357	51.81	91
May 10.8	43.793	362	52.72	142
20.7	44.155	359	54.14	186
30.7	44.514	345	56.00	228
June 9.7	44.859	324	58.28	262
19.7	45.183	292	60.90	289
29.6	45.475	254	63.79	308
July 9.6	45.729	211	66.87	320
19.6	45.940	161	70.07	324
29.5	46.101	109	73.31	321
Aug. 8.5	46.210	57	76.52	312
18.5	46.267	3 —	79.64	295
28.5	46.270	46	82.59	274
Sept. 7.4	46.224	93	85.33	247
17.4	46.131	134	87.80	215
27.4	45.997	167	89.95	179
Oct. 7.4	45.830	191	91.74	140
17.3	45.639	210	93.14	98
27.3	45.429	218	94.12	52
Nov. 6.3	45.211	218	94.64	5 —
16.2	44.993	210	94.69	41
26.2	44.783	197	94.28	89
Dec. 6.2	44.586	177	93.39	133
16.2	44.409	148	92.06	174
26.1	44.261	117	90.32	209
36.1	44.144		88.23	
Mean Place	42.098		56.72	
Sec δ, Tan δ	1.306		+0.841	
$D_\psi\alpha$, $D_\omega\alpha$	+0.05		−0.04	
$D_\psi\delta$, $D_\omega\delta$	+0.3		−0.8	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Capricorni. Mag. 3.8 Right Ascension.		γ Capricorni. Declination.		ε Pegasi. Mag. 2.5 Right Ascension.		ε Pegasi. Declination.		11 Cephei. Mag. 4.8 Right Ascension.		11 Cephei. Declination.		δ Capricorni. Mag. 3.0 Right Ascension.		δ Capricorni. Declination.	
	h m 21 35		° ′ −17 1		h m 21 40		° ′ + 9 30		h m 21 40		° ′ +70 56		h m 21 42		° ′ −16 29	
	s		″		s		″		s		″		s		″	
Jan. 1.1	36.380	25	41.67	0	12.506	40	19.26	126	42.31	40	38.36	236	34.401	31	41.88	4
11.1	36.355	4	41.67	13	12.466	10	18.00	128	41.91	31	36.00	275	34.370	2	41.92	8
21.1	36.359	36	41.54	27	12.456	20	16.72	127	41.60	19	33.25	305	34.368	28	41.84	24
31.0	36.395	67	41.27	41	12.476	48	15.45	118	41.41	7	30.20	320	34.396	59	41.60	38
Feb. 10.0	36.462	97	40.86	57	12.524	81	14.27	104	41.34	4	27.00	323	34.455	89	41.22	54
20.0	36.559	129	40.29	75	12.605	113	13.23	84	41.38	16	23.77	313	34.544	121	40.68	72
Mar. 2.0	36.688	160	39.54	92	12.718	144	12.39	58	41.54	29	20.64	292	34.665	153	39.95	89
11.9	36.848	189	38.62	110	12.862	177	11.81	27	41.83	39	17.72	256	34.818	182	39.06	109
21.9	37.037	220	37.52	126	13.039	208	11.54	4	42.22	50	15.16	214	35.000	214	37.97	126
31.9	37.257	247	36.26	141	13.247	235	11.58	42	42.72	58	13.02	161	35.214	241	36.71	141
Apr. 10.9	37.504	270	34.85	153	13.482	261	12.00	76	43.30	65	11.41	102	35.455	267	35.30	155
20.8	37.774	291	33.32	164	13.743	280	12.76	110	43.95	69	10.39	43	35.722	288	33.75	165
30.8	38.065	308	31.68	169	14.023	297	13.86	140	44.64	72	9.96	20	36.010	306	32.10	171
May 10.8	38.373	315	29.99	169	14.320	306	15.26	168	45.36	73	10.16	81	36.316	315	30.39	173
20.7	38.688	319	28.30	166	14.626	306	16.94	191	46.09	71	10.97	140	36.631	319	28.66	169
30.7	39.007	314	26.64	158	14.932	300	18.85	207	46.80	67	12.37	194	36.950	315	26.97	161
June 9.7	39.321	299	25.06	146	15.232	288	20.92	218	47.47	62	14.31	242	37.265	301	25.36	151
19.7	39.620	280	23.60	130	15.520	265	23.10	223	48.09	54	16.73	283	37.566	284	23.85	134
29.6	39.900	251	22.30	110	15.785	238	25.33	223	48.63	46	19.56	316	37.850	255	22.51	114
July 9.6	40.151	217	21.20	89	16.023	203	27.56	218	49.09	35	22.72	345	38.105	220	21.37	93
19.6	40.368	176	20.31	65	16.226	165	29.74	205	49.44	25	26.17	361	38.325	182	20.44	69
29.6	40.544	132	19.66	42	16.391	122	31.79	192	49.69	15	29.78	373	38.507	139	19.75	47
Aug. 8.5	40.676	87	19.24	18	16.513	78	33.71	174	49.84	4	33.51	374	38.646	93	19.28	21
18.5	40.763	38	19.06	2	16.591	34	35.45	152	49.88	8	37.25	368	38.739	46	19.07	1
28.5	40.801	6	19.08	22	16.625	8	36.97	131	49.80	19	40.93	354	38.785	0	19.06	20
Sept. 7.4	40.795	47	19.30	37	16.617	46	38.28	106	49.61	28	44.47	334	38.785	41	19.26	35
17.4	40.748	84	19.67	50	16.571	82	39.34	81	49.33	37	47.81	306	38.744	78	19.61	49
27.4	40.664	115	20.17	58	16.489	109	40.15	57	48.96	44	50.87	270	38.666	109	20.10	59
Oct. 7.4	40.549	136	20.75	63	16.380	129	40.72	32	48.52	52	53.57	231	38.557	131	20.69	64
17.3	40.413	149	21.38	63	16.251	143	41.04	9	48.00	58	55.88	183	38.426	145	21.33	65
27.3	40.264	154	22.01	62	16.108	148	41.13	15	47.42	60	57.71	132	38.281	152	21.98	64
Nov. 6.3	40.110	152	22.63	57	15.960	147	40.98	36	46.82	62	59.03	76	38.129	149	22.62	60
16.3	39.958	140	23.20	49	15.813	138	40.62	58	46.20	62	59.79	17	37.980	141	23.22	54
26.2	39.818	123	23.69	42	15.675	124	40.04	79	45.58	60	59.96	43	37.839	123	23.76	45
Dec. 6.2	39.695	101	24.11	31	15.551	106	39.25	96	44.98	58	59.53	102	37.716	104	24.21	36
16.2	39.594	75	24.42	21	15.445	83	38.29	112	44.40	52	58.51	159	37.612	79	24.57	25
26.1	39.519	47	24.63	9	15.362	58	37.17	122	43.88	46	56.92	211	37.533	53	24.82	14
36.1	39.472		24.72		15.304		35.95		43.42		54.81		37.480		24.96	
Mean Place	36.330		43.54		12.445		10.84		44.390		17.60		34.325		43.77	
Sec δ, Tan δ	1.046		−0.306		1.014		+0.167		3.063		+2.895		1.043		−0.296	
$D_\psi\alpha$, $D_\omega\alpha$	+0.07		+0.02		+0.06		−0.01		+0.02		−0.16		+0.06		+0.02	
$D_\psi\delta$, $D_\omega\delta$	+0.3		−0.6		+0.3		−0.6		+0.3		−0.6		+0.3		−0.6	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ι Aquarii. Mag. 4.4 Right Ascension.		Declination.		20 Cephei. Mag. 5.4 Right Ascension.		Declination.		α Gruis. Mag. 2.2 Right Ascension.		Declination.		ι Pegasi. Mag. 4.0 Right Ascension.		Declination.	
	h m 22 2		° ′ −14 15		h m 22 2		° ′ +62 23		h m 22 3		° ′ −47 20		h m 22 3		° ′ +24 56	
	s		″		s		″		s		″		s		″	
Jan. 1.1	4.010	48	45.42	16	31.91	28	45.17	219	7.871	98	79.95	141	14.452	76	69.15	168
11.1	3.962	20	45.58	3	31.63	21	42.98	258	7.773	54	78.54	173	14.376	48	67.47	183
21.1	3.942	8	45.61	11	31.42	14	40.40	288	7.719	11	76.81	200	14.328	17	65.64	192
31.1	3.950	37	45.50	27	31.28	7	37.52	306	7.708	34	74.81	221	14.311	17	63.72	192
Feb. 10.0	3.987	67	45.23	44	31.21	1	34.46	312	7.742	79	72.60	238	14.328	50	61.80	184
20.0	4.054	99	44.79	63	31.22	9	31.34	303	7.821	125	70.22	251	14.378	87	59.96	167
Mar. 2.0	4.153	130	44.16	82	31.31	18	28.31	286	7.946	169	67.71	259	14.465	125	58.29	142
11.9	4.283	163	43.34	102	31.49	25	25.45	253	8.115	214	65.12	262	14.590	163	56.87	110
21.9	4.446	193	42.32	122	31.74	34	22.92	213	8.329	257	62.50	257	14.753	200	55.77	72
31.9	4.639	225	41.10	139	32.08	40	20.79	163	8.586	296	59.93	252	14.953	233	55.05	31
Apr. 10.9	4.864	253	39.71	155	32.48	46	19.16	108	8.882	333	57.41	240	15.186	264	54.74	14
20.8	5.117	276	38.16	169	32.94	50	18.08	49	9.215	365	55.01	222	15.450	289	54.88	58
30.8	5.393	295	36.47	177	33.44	52	17.59	11	9.580	391	52.79	199	15.739	310	55.46	101
May 10.8	5.688	310	34.70	181	33.96	55	17.70	72	9.971	407	50.80	173	16.049	322	56.47	142
20.8	5.998	316	32.89	180	34.51	54	18.42	128	10.378	417	49.07	141	16.371	326	57.89	179
30.7	6.314	315	31.09	176	35.05	52	19.70	182	10.795	416	47.66	107	16.697	322	59.68	210
June 9.7	6.629	305	29.33	165	35.57	49	21.52	231	11.211	404	46.59	69	17.019	309	61.78	234
19.7	6.934	290	27.68	151	36.06	45	23.83	272	11.615	383	45.90	31	17.328	290	64.12	255
29.6	7.224	263	26.17	132	36.51	39	26.55	307	11.998	351	45.59	10	17.618	262	66.67	266
July 9.6	7.487	234	24.85	112	36.90	32	29.62	333	12.349	310	45.69	46	17.880	227	69.33	273
19.6	7.721	196	23.73	89	37.22	25	32.95	353	12.659	259	46.15	85	18.107	188	72.06	272
29.6	7.917	154	22.84	63	37.47	18	36.48	364	12.918	204	47.00	118	18.295	143	74.78	265
Aug. 8.5	8.071	109	22.21	40	37.65	10	40.12	367	13.122	141	48.18	145	18.438	98	77.43	253
18.5	8.180	64	21.81	16	37.75	2	43.79	363	13.263	79	49.63	169	18.536	52	79.96	237
28.5	8.244	19	21.65	4	37.77	6	47.42	350	13.342	16	51.32	183	18.588	7	82.33	216
Sept. 7.5	8.263	23	21.69	26	37.71	13	50.92	332	13.358	47	53.15	192	18.595	35	84.49	192
17.4	8.240	61	21.95	40	37.58	21	54.24	305	13.311	103	55.07	192	18.560	72	86.41	164
27.4	8.179	91	22.35	52	37.37	26	57.29	273	13.208	151	56.99	183	18.488	103	88.05	135
Oct. 7.4	8.088	118	22.87	60	37.11	31	60.02	235	13.057	189	58.82	165	18.385	129	89.40	102
17.3	7.970	134	23.47	66	36.80	35	62.37	190	12.868	218	60.47	142	18.256	147	90.42	69
27.3	7.836	142	24.13	66	36.45	38	64.27	139	12.650	235	61.89	112	18.109	157	91.11	35
Nov. 6.3	7.694	144	24.79	65	36.07	40	65.66	87	12.415	240	63.01	76	17.952	160	91.46	1
16.3	7.550	139	25.44	60	35.67	40	66.53	30	12.175	234	63.77	38	17.792	158	91.47	36
26.2	7.411	128	26.04	54	35.27	40	66.83	27	11.941	217	64.15	1	17.634	149	91.11	70
Dec. 6.2	7.283	109	26.58	46	34.87	38	66.56	86	11.724	193	64.14	43	17.485	135	90.41	101
16.2	7.174	90	27.04	37	34.49	35	65.70	142	11.531	161	63.71	82	17.350	116	89.40	132
26.2	7.084	65	27.41	25	34.14	31	64.28	193	11.370	124	62.89	118	17.234	94	88.08	157
36.1	7.019		27.66		33.83		62.35		11.246		61.71		17.140		86.51	
Mean Place	3.847		47.63		32.767		24.23		8.061		74.79		14.360		56.23	
Sec δ, Tan δ	1.032		−0.254		2.158		+1.912		1.476		−1.086		1.103		+0.465	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		+0.01		+0.04		−0.11		+0.08		+0.06		+0.05		−0.03	
$D_\psi\delta$, $D_\omega\delta$	+0.3		−0.5		+0.3		−0.5		+0.3		−0.5		+0.3		−0.5	

FOR THE UPPER TRANSIT AT WASHINGTON.

shington an Time.	θ Aquarii. Mag. 4.3 Right Ascension.		θ Aquarii. Declination.		α Tucanæ. Mag. 2.9 Right Ascension.		α Tucanæ. Declination.		γ Aquarii. Mag. 4.0 Right Ascension.		γ Aquarii. Declination.		31 Pegasi. Mag. 4.9 Right Ascension.		31 Pegasi. Declination.	
	h m 22 12		° ′ − 8 10		h m 22 12		° ′ −60 39		h m 22 17		° ′ − 1 47		h m 22 17		° ′ +11 47	
	s		″		s		″		s		″		s		″	
n. 1.1	33.854	54	69.65	44	57.16	18	56.83	194	28.639	58	39.49	70	32.108	66	57.18	120
11.1	33.800	29	70.09	35	56.98	13	54.89	230	28.581	34	40.19	66	32.042	44	55.98	127
21.1	33.771	3	70.44	23	56.85	7	52.59	262	28.547	10	40.85	58	31.998	16	54.71	128
31.1	33.768	25	70.67	9	56.78	0	49.97	284	28.537	19	41.43	47	31.982	12	53.43	122
eb. 10.0	33.793	54	70.76	7	56.78	7	47.13	303	28.556	47	41.90	31	31.994	42	52.21	111
20.0	33.847	86	70.69	27	56.85	13	44.10	312	28.603	78	42.21	13	32.036	74	51.10	95
ar. 2.0	33.933	117	70.42	47	56.98	20	40.98	316	28.681	110	42.34	10	32.110	108	50.15	70
12.0	34.050	149	69.95	71	57.18	25	37.82	313	28.791	142	42.24	35	32.218	142	49.45	43
21.9	34.199	181	69.24	93	57.43	32	34.69	302	28.933	176	41.89	61	32.360	177	49.02	10
31.9	34.380	213	68.31	117	57.75	37	31.67	289	29.109	208	41.28	87	32.537	211	48.92	24
r. 10.9	34.593	241	67.14	137	58.12	42	28.78	266	29.317	236	40.41	115	32.748	239	49.16	60
20.8	34.834	268	65.77	155	58.54	46	26.12	240	29.553	264	39.26	137	32.987	267	49.76	93
30.8	35.102	287	64.22	171	59.00	50	23.72	208	29.817	283	37.89	159	33.254	288	50.69	128
ay 10.8	35.389	304	62.51	181	59.50	52	21.64	171	30.100	300	36.30	175	33.542	303	51.97	157
20.8	35.693	310	60.70	186	60.02	54	19.93	130	30.400	308	34.55	188	33.845	310	53.54	182
30.7	36.003	311	58.84	188	60.56	54	18.63	86	30.708	308	32.67	195	34.155	311	55.36	202
ne 9.7	36.314	302	56.96	183	61.10	53	17.77	41	31.016	301	30.72	197	34.466	301	57.38	218
19.7	36.616	289	55.13	175	61.63	50	17.36	6	31.317	287	28.75	193	34.767	287	59.56	226
29.7	36.905	264	53.38	160	62.13	46	17.42	52	31.604	263	26.82	186	35.054	263	61.82	228
ly 9.6	37.169	236	51.78	144	62.59	41	17.94	95	31.867	236	24.96	174	35.317	234	64.10	227
19.6	37.405	199	50.34	122	63.00	35	18.89	138	32.103	199	23.22	155	35.551	197	66.37	219
29.6	37.604	160	49.12	102	63.35	27	20.27	173	32.302	161	21.67	137	35.748	157	68.56	205
g. 8.5	37.764	115	48.10	77	63.62	18	22.00	204	32.463	118	20.30	115	35.905	114	70.61	190
18.5	37.879	73	47.33	54	63.80	11	24.04	225	32.581	75	19.15	93	36.019	71	72.51	170
28.5	37.952	29	46.79	31	63.91	2	26.29	239	32.656	32	18.22	69	36.090	28	74.21	149
pt. 7.5	37.981	13	46.48	10	63.93	6	28.68	244	32.688	8	17.53	48	36.118	12	75.70	124
17.4	37.968	48	46.38	8	63.87	14	31.12	239	32.680	44	17.05	25	36.106	48	76.94	101
27.4	37.920	82	46.46	26	63.73	23	33.51	224	32.636	76	16.80	7	36.058	80	77.95	75
ct. 7.4	37.838	105	46.72	38	63.50	27	35.75	199	32.560	101	16.73	11	35.978	103	78.70	51
17.4	37.733	124	47.10	49	63.23	31	37.74	166	32.459	119	16.84	26	35.875	123	79.21	25
27.3	37.609	134	47.59	55	62.92	35	39.40	126	32.340	129	17.10	39	35.752	134	79.46	2
ov. 6.3	37.475	137	48.14	59	62.57	36	40.66	80	32.211	134	17.49	50	35.618	138	79.48	23
16.3	37.338	134	48.73	62	62.21	36	41.46	31	32.077	131	17.99	59	35.480	137	79.25	45
26.2	37.204	124	49.35	62	61.85	34	41.77	21	31.946	123	18.58	65	35.343	130	78.80	67
ec. 6.2	37.080	110	49.97	61	61.51	32	41.56	71	31.823	110	19.23	72	35.213	117	78.13	85
16.2	36.970	92	50.58	56	61.19	27	40.85	121	31.713	95	19.95	73	35.096	102	77.28	103
26.2	36.878	71	51.14	51	60.92	21	39.64	166	31.618	73	20.68	74	34.994	83	76.25	117
36.1	36.807		51.65		60.71		37.98		31.545		21.42		34.911		75.08	
n Place	33.629		73.41		57.760		49.32		28.383		45.05		31.866		47.67	
, Tan δ	1.010		−0.144		2.041		−1.779		1.000		−0.031		1.022		+0.209	
$D_\omega\alpha$	+0.06		+0.01		+0.08		+0.11		+0.06		0.00		+0.08		−0.01	
$D_\omega\delta$	+0.4		−0.5		+0.4		−0.5		+0.4		−0.4		+0.4		−0.4	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	8 Lacertæ. Mag. 4.6 Right Ascension.		Declination.		τ Aquarii. Mag. 4.6 Right Ascension.		Declination.		σ Aquarii. Mag. 4.9 Right Ascension.		Declination.		α Lacertæ. Mag. 3.8 Right Ascension.		Declination.
	h m 22 20		° ′ +51 49		h m 22 21		° ′ + 0 57		h m 22 26		° ′ −11 5		h m 22 27		° ′ +49 5
	s		″		s		″		s		″		s		″
Jan. 1.2	22.157	190	42.21	199	8.691	60	63.47	81	22.023	62	31.33	32	57.076	184	76.10
11.1	21.967	151	40.22	235	8.631	39	62.66	78	21.961	41	31.65	20	56.892	146	74.21
21.1	21.816	105	37.87	264	8.592	13	61.88	72	21.920	15	31.85	6	56.746	106	71.94
31.1	21.711	55	35.23	280	8.579	14	61.16	62	21.905	12	31.91	9	56.640	58	69.39
Feb. 10.0	21.656	3	32.43	285	8.593	42	60.54	48	21.917	40	31.82	27	56.582	5	66.68
20.0	21.659	61	29.58	279	8.635	74	60.06	28	21.957	72	31.55	46	56.577	52	63.91
Mar. 2.0	21.720	123	26.79	261	8.709	106	59.78	7	22.029	104	31.09	68	56.629	110	61.19
12.0	21.843	184	24.18	232	8.815	138	59.71	19	22.133	135	30.41	88	56.739	169	58.64
21.9	22.027	242	21.86	193	8.953	172	59.90	46	22.268	170	29.53	111	56.908	225	56.38
31.9	22.269	296	19.93	147	9.125	203	60.36	75	22.438	203	28.42	131	57.133	278	54.47
Apr. 10.9	22.565	343	18.46	94	9.328	234	61.11	102	22.641	233	27.11	149	57.411	326	53.02
20.9	22.908	382	17.52	40	9.562	261	62.13	129	22.874	261	25.62	167	57.737	364	52.08
30.8	23.290	410	17.12	17	9.823	282	63.42	152	23.135	283	23.95	179	58.101	395	51.67
May 10.8	23.700	427	17.29	73	10.105	298	64.94	173	23.418	301	22.16	186	58.496	412	51.88
20.8	24.127	433	18.02	128	10.403	307	66.67	187	23.719	311	20.30	190	58.908	421	52.58
30.7	24.560	427	19.30	177	10.710	308	68.54	197	24.030	313	18.40	189	59.329	417	53.77
June 9.7	24.987	408	21.07	223	11.018	301	70.51	201	24.343	308	16.51	181	59.746	402	55.50
19.7	25.395	382	23.30	261	11.319	287	72.52	202	24.651	296	14.70	169	60.148	377	57.68
29.7	25.777	342	25.91	293	11.606	265	74.54	195	24.947	275	13.01	155	60.525	341	60.24
July 9.6	26.119	296	28.84	318	11.871	236	76.49	185	25.222	247	11.46	135	60.866	300	63.10
19.6	26.415	243	32.02	334	12.107	202	78.34	169	25.469	212	10.11	112	61.166	248	66.23
29.6	26.658	184	35.36	344	12.309	163	80.03	152	25.681	173	8.99	88	61.414	193	69.52
Aug. 8.6	26.842	125	38.80	346	12.472	120	81.55	132	25.854	130	8.11	63	61.607	135	72.91
18.5	26.967	64	42.26	341	12.592	78	82.87	109	25.984	87	7.48	39	61.742	76	76.32
28.5	27.031	1	45.67	329	12.670	35	83.96	87	26.071	43	7.09	14	61.818	18	79.68
Sept. 7.5	27.032	55	48.96	309	12.705	6	84.83	62	26.114	1	6.95	7	61.836	37	82.93
17.4	26.977	108	52.05	285	12.699	41	85.45	42	26.115	38	7.02	26	61.799	89	85.99
27.4	26.869	154	54.90	254	12.658	74	85.87	20	26.077	71	7.28	42	61.710	135	88.82
Oct. 7.4	26.715	194	57.44	217	12.584	97	86.07	2	26.006	97	7.70	53	61.575	174	91.34
17.4	26.521	226	59.61	176	12.487	118	86.09	17	25.909	118	8.23	61	61.401	205	93.50
27.3	26.295	250	61.37	130	12.369	128	85.92	31	25.791	129	8.84	66	61.196	228	95.27
Nov. 6.3	26.045	265	62.67	81	12.241	132	85.61	45	25.662	135	9.50	68	60.968	245	96.59
16.3	25.780	271	63.48	29	12.109	131	85.16	56	25.527	134	10.18	67	60.723	252	97.44
26.3	25.509	270	63.77	24	11.978	123	84.60	67	25.393	127	10.85	63	60.471	252	97.77
Dec. 6.2	25.239	258	63.53	77	11.855	111	83.93	74	25.266	114	11.48	58	60.219	243	97.59
16.2	24.981	241	62.76	129	11.744	97	83.19	79	25.152	99	12.06	49	59.976	228	96.89
26.2	24.740	212	61.47	175	11.647	76	82.40	81	25.053	80	12.55	41	59.748	204	95.69
36.1	24.528		59.72		11.571		81.59		24.973		12.96		59.544		94.02
Mean Place	22.348		22.35		8.418		57.11		21.744		34.13		57.137		56.36
Sec δ, Tan δ	1.618		+1.272		1.000		+0.017		1.019		−0.196		1.552		+1.186
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.05		−0.08		+0.06		0.00		+0.06		+0.01		+0.05		−0.07
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.4		−0.4		+0.4		−0.4		+0.4		−0.4		+0.4		−0.4

FOR THE UPPER TRANSIT AT WASHINGTON.

hington n Time.	υ Aquarii. Mag. 5.3 Right Ascension.		υ Aquarii. Declination.		226 B. Cephei. Mag. 5.7 Right Ascension.		226 B. Cephei. Declination.	
	h m 22 30		° ′ −21 6		h m 22 30		° ′ +75 48	
	s		″		s		″	
n. 1.2	16.123		85.40		49.61		56.08	
11.1	16.052	71	85.31	9	48.93	68	54.33	175
21.1	16.005	47	85.01	30	48.37	56	52.08	225
31.1	15.985	20	84.52	49	47.91	46	49.41	267
b. 10.1	15.994	9	83.83	69	47.60	31	46.44	297
20.0	16.032	38	82.94	89	47.45	15	43.30	314
r. 2.0	16.103	71	81.85	109	47.45	0	40.09	321
12.0	16.207	104	80.58	127	47.62	17	36.97	312
21.9	16.344	137	79.13	145	47.97	35	34.04	293
31.9	16.517	173	77.51	162	48.45	48	31.43	261
r. 10.9	16.724	207	75.75	176	49.08	63	29.24	219
20.9	16.962	238	73.88	187	49.82	74	27.54	170
30.8	17.230	268	71.93	195	50.67	85	26.39	115
y 10.8	17.521	291	69.95	198	51.57	90	25.83	56
20.8	17.832	311	67.99	196	52.51	94	25.89	6
30.8	18.155	323	66.09	190	53.46	95	26.55	66
ne 9.7	18.481	326	64.30	179	54.40	94	27.78	123
19.7	18.804	323	62.68	162	55.28	88	29.55	177
29.7	19.113	309	61.26	142	56.10	82	31.82	227
y 9.6	19.403	290	60.08	118	56.82	72	34.52	270
19.6	19.664	261	59.16	92	57.44	62	37.59	307
29.6	19.889	225	58.54	62	57.94	50	40.94	335
g. 8.6	20.076	187	58.20	34	58.32	38	44.52	358
18.5	20.217	141	58.14	6	58.54	22	48.23	371
28.5	20.312	95	58.35	21	58.63	9	52.01	378
t. 7.5	20.361	49	58.80	45	58.58	5	55.76	375
17.4	20.365	4	59.46	66	58.40	18	59.42	366
27.4	20.327	38	60.26	80	58.09	31	62.91	349
. 7.4	20.254	73	61.19	93	57.66	43	66.15	324
17.4	20.152	102	62.16	97	57.12	54	69.07	292
27.3	20.027	125	63.13	97	56.48	64	71.59	252
v. 6.3	19.889	138	64.08	95	55.77	71	73.66	207
16.3	19.744	145	64.93	85	55.00	77	75.22	156
26.3	19.599	145	65.66	73	54.19	81	76.22	100
c. 6.2	19.461	138	66.24	58	53.37	82	76.60	38
16.2	19.336	125	66.66	42	52.55	82	76.38	22
26.2	19.228	108	66.89	23	51.76	79	75.54	84
. 36.1	19.139	89	66.95	6	51.03	73	74.10	144
Place	15.869		85.34		51.359		32.11	
Tan δ	1.072		−0.386		4.081		+3.956	
$D_{\psi\alpha}$	+0.06		+0.02		+0.02		−0.24	
$D_{\psi\delta}$	+0.4		−0.4		+0.4		−0.4	

hington n Time.	η Aquarii. Mag. 4.1 Right Ascension.		η Aquarii. Declination.		10 Lacertæ. Mag. 4.9 Right Ascension.		10 Lacertæ. Declination.	
	h m 22 31		° ′ − 0 31		h m 22 35		° ′ +38 37	
	s		″		s		″	
n. 1.2	11.993		61.39		37.670		59.15	
11.1	11.926	67	62.14	75	37.536	134	57.42	173
21.1	11.880	46	62.83	69	37.430	106	55.39	203
31.1	11.859	21	63.47	64	37.355	75	53.16	223
b. 10.1	11.863	4	63.99	52	37.317	38	50.81	235
20.0	11.897	34	64.37	38	37.319	2	48.43	238
r. 2.0	11.961	64	64.56	19	37.365	46	46.14	229
12.0	12.056	95	64.53	3	37.457	92	44.03	211
21.9	12.185	129	64.25	28	37.599	142	42.19	184
31.9	12.349	164	63.71	54	37.785	186	40.71	148
r. 10.9	12.545	196	62.89	82	38.017	232	39.65	106
20.9	12.772	227	61.80	109	38.290	273	39.06	59
30.8	13.028	256	60.46	134	38.598	308	38.97	9
y 10.8	13.306	278	58.90	156	38.932	334	39.38	41
20.8	13.602	296	57.16	174	39.287	355	40.30	92
30.8	13.909	307	55.29	187	39.651	364	41.67	137
ne 9.7	14.219	310	53.32	197	40.016	365	43.48	181
19.7	14.522	303	51.32	200	40.370	354	45.66	218
29.7	14.814	292	49.34	198	40.706	336	48.16	250
y 9.6	15.086	272	47.43	191	41.014	308	50.91	275
19.6	15.329	243	45.63	180	41.287	273	53.84	293
29.6	15.538	209	43.99	164	41.521	234	56.90	306
g. 8.6	15.710	172	42.54	145	41.706	185	59.99	309
18.5	15.841	131	41.30	124	41.843	137	63.05	306
28.5	15.929	88	40.29	101	41.930	87	66.04	299
t. 7.5	15.975	46	39.51	78	41.968	38	68.88	284
17.4	15.980	5	38.95	56	41.958	10	71.52	264
27.4	15.947	33	38.62	33	41.905	53	73.92	240
. 7.4	15.883	64	38.50	12	41.813	92	76.03	211
17.4	15.793	90	38.55	5	41.687	126	77.81	178
27.3	15.684	109	38.78	23	41.536	151	79.23	142
v. 6.3	15.560	124	39.14	36	41.365	171	80.24	101
16.3	15.431	129	39.62	48	41.182	183	80.83	59
26.3	15.302	129	40.20	58	40.993	189	80.98	15
c. 6.2	15.179	123	40.85	65	40.804	189	80.68	30
16.2	15.066	113	41.58	73	40.622	182	79.94	74
26.2	14.967	99	42.34	76	40.454	168	78.79	115
. 36.1	14.884	83	43.10	76	40.303	151	77.24	155
Place	11.670		67.29		37.482		41.82	
Tan δ	1.000		−0.009		1.280		+0.799	
$D_{\psi\alpha}$	+0.06		0.00		+0.05		−0.05	
$D_{\psi\delta}$	+0.4		−0.4		+0.4		−0.4	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	λ Pegasi. Mag. 4.1 Right Ascension.		λ Pegasi. Declination.		ε Gruis. Mag. 3.7 Right Ascension.		ε Gruis. Declination.		τ Aquarii. Mag. 4.2 Right Ascension.		τ Aquarii. Declination.		μ Pegasi. Mag. 3.7 Right Ascension.		μ Pegasi. Declination.	
	h m 22 42		° ′ +23 8		h m 22 43		° ′ −51 44		h m 22 45		° ′ −14 0		h m 22 46		° ′ +24 10	
	s		″		s		″		s		″		s		″	
Jan. 1.2	38.008	97	33.75	141	40.014	165	42.49	132	18.675	77	71.80	22	5.908	101	38.26	140
11.1	37.911	75	32.34	159	39.849	126	41.17	172	18.598	56	72.02	8	5.807	78	36.86	159
21.1	37.836	51	30.75	168	39.723	83	39.45	207	18.542	32	72.10	9	5.729	55	35.27	171
31.1	37.785	22	29.07	172	39.640	38	37.38	235	18.510	7	72.01	27	5.674	26	33.56	175
Feb. 10.1	37.763	10	27.35	166	39.602	10	35.03	260	18.503	21	71.74	46	5.648	6	31.81	171
20.0	37.773	44	25.69	156	39.612	59	32.43	277	18.524	51	71.28	67	5.654	41	30.10	159
Mar. 2.0	37.817	83	24.13	135	39.671	110	29.66	290	18.575	85	70.61	86	5.695	79	28.51	141
12.0	37.900	122	22.78	107	39.781	161	26.76	297	18.660	118	69.75	109	5.774	119	27.10	113
21.9	38.022	161	21.71	75	39.942	213	23.79	297	18.778	153	68.66	129	5.893	158	25.97	81
31.9	38.183	200	20.96	37	40.155	261	20.82	292	18.931	187	67.37	147	6.051	198	25.16	44
Apr. 10.9	38.383	234	20.59	2	40.416	307	17.90	282	19.118	219	65.90	166	6.249	233	24.72	4
20.9	38.617	267	20.61	44	40.723	351	15.08	263	19.337	252	64.24	179	6.482	266	24.68	38
30.8	38.884	293	21.05	85	41.074	386	12.45	242	19.589	276	62.45	190	6.748	292	25.06	80
May 10.8	39.177	312	21.90	124	41.460	414	10.03	212	19.865	296	60.55	195	7.040	313	25.86	119
20.8	39.489	324	23.14	160	41.874	433	7.91	179	20.161	311	58.60	196	7.353	325	27.05	156
30.8	39.813	327	24.74	190	42.307	443	6.12	142	20.472	317	56.64	192	7.678	329	28.61	187
June 9.7	40.140	321	26.64	217	42.750	442	4.70	101	20.789	315	54.72	183	8.007	324	30.48	215
19.7	40.461	307	28.81	236	43.192	429	3.69	57	21.104	304	52.89	168	8.331	310	32.63	235
29.7	40.768	286	31.17	250	43.621	402	3.12	12	21.408	287	51.21	151	8.641	290	34.98	250
July 9.6	41.054	257	33.67	258	44.023	368	3.00	33	21.695	261	49.70	129	8.931	261	37.48	258
19.6	41.311	221	36.25	259	44.391	322	3.33	75	21.956	230	48.41	103	9.192	226	40.06	264
29.6	41.532	182	38.84	254	44.713	267	4.08	117	22.186	191	47.38	77	9.418	187	42.70	257
Aug. 8.6	41.714	141	41.38	245	44.980	206	5.25	151	22.377	149	46.61	51	9.605	144	45.27	249
18.5	41.855	95	43.83	231	45.186	139	6.76	181	22.526	106	46.10	23	9.749	99	47.76	236
28.5	41.950	52	46.14	212	45.325	72	8.57	205	22.632	62	45.87	1	9.848	56	50.12	218
Sept. 7.5	42.002	9	48.26	191	45.397	3	10.62	218	22.694	19	45.88	25	9.904	12	52.30	197
17.5	42.011	29	50.17	166	45.400	61	12.80	224	22.713	20	46.13	43	9.916	26	54.27	172
27.4	41.982	64	51.83	140	45.339	119	15.04	221	22.693	56	46.56	59	9.890	61	55.99	145
Oct. 7.4	41.918	91	53.23	110	45.220	169	17.25	207	22.637	83	47.15	72	9.829	89	57.44	116
17.4	41.827	115	54.33	80	45.051	211	19.32	186	22.554	107	47.87	78	9.740	113	58.60	87
27.3	41.712	130	55.13	50	44.840	239	21.18	155	22.447	123	48.65	80	9.627	129	59.47	54
Nov. 6.3	41.582	140	55.63	17	44.601	258	22.73	119	22.324	131	49.45	80	9.498	140	60.01	22
16.3	41.442	145	55.80	15	44.343	263	23.92	78	22.193	134	50.25	75	9.358	145	60.23	11
26.3	41.297	144	55.65	46	44.080	257	24.70	33	22.059	129	51.00	67	9.213	144	60.12	43
Dec. 6.2	41.153	137	55.19	77	43.823	244	25.03	14	21.930	120	51.67	58	9.069	139	59.69	74
16.2	41.016	126	54.42	106	43.579	219	24.89	60	21.810	108	52.25	47	8.930	129	58.95	103
26.2	40.890	111	53.36	129	43.360	190	24.29	104	21.702	93	52.72	34	8.801	114	57.92	130
36.2	40.779		52.07		43.170		23.25		21.609		53.06		8.687		56.62	
Mean Place	37.657		20.58		40.108		35.00		18.314		73.51		5.536		24.76	
Sec δ, Tan δ	1.087		+0.427		1.615		−1.268		1.031		−0.250		1.096		+0.449	
$D_{\psi}\alpha$, $D_{\omega}\alpha$	+0.06		−0.03		+0.07		+0.08		+0.06		+0.02		+0.06		−0.03	
$D_{\psi}\delta$, $D_{\omega}\delta$	+0.4		−0.3		+0.4		−0.3		+0.4		−0.3		+0.4		−0.3	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ι Cephei. Mag. 3.7 Right Ascension.		ι Cephei. Declination.		λ Aquarii. Mag. 3.8 Right Ascension.		λ Aquarii. Declination.		ρ Indi. Mag. 6.1 Right Ascension.		ρ Indi. Declination.		δ Aquari Mag. 3. Right Ascension.		I
	h m 22 46		° ′ +65 46		h m 22 48		° ′ − 8 0		h m 22 49		° ′ −70 29		h m 22 50		
	s		″		s		″		s		″		s		
Jan. 1.2	47.21	38	50.12	168	23.769	76	35.99	46	1.33	40	94.85	199	21.553	82	6
11.1	46.83	31	48.44	216	23.693	58	36.45	35	0.93	33	92.86	242	21.471	61	6
21.1	46.52	26	46.28	255	23.635	36	36.80	22	0.60	24	90.44	281	21.410	38	6
31.1	46.26	19	43.73	285	23.599	9	37.02	8	0.36	15	87.63	313	21.372	12	6
Feb. 10.1	46.07	10	40.88	304	23.590	17	37.10	9	0.21	6	84.50	335	21.360	16	6
20.0	45.97	0	37.84	308	23.607	46	37.01	29	0.15	5	81.15	351	21.376	45	6
Mar. 2.0	45.97	9	34.76	302	23.653	80	36.72	51	0.20	14	77.64	356	21.421	80	6
12.0	46.06	20	31.74	280	23.733	114	36.21	74	0.34	24	74.08	356	21.501	113	6
22.0	46.26	28	28.94	250	23.847	148	35.47	96	0.58	33	70.52	347	21.614	150	6
31.9	46.54	37	26.44	211	23.995	182	34.51	120	0.91	41	67.05	332	21.764	183	6
Apr. 10.9	46.91	45	24.33	162	24.177	216	33.31	141	1.32	50	63.73	308	21.947	218	5
20.9	47.36	51	22.71	108	24.393	246	31.90	161	1.82	58	60.65	280	22.165	250	5
30.8	47.87	56	21.63	50	24.639	272	30.29	176	2.40	64	57.85	245	22.415	275	5
May 10.8	48.43	59	21.13	9	24.911	292	28.53	187	3.04	68	55.40	203	22.690	298	5
20.8	49.02	61	21.22	67	25.203	307	26.66	194	3.72	72	53.37	159	22.988	312	5
30.8	49.63	61	21.89	123	25.510	312	24.72	197	4.44	73	51.78	111	23.300	319	4
June 9.7	50.24	58	23.12	176	25.822	309	22.75	192	5.17	74	50.67	60	23.619	318	4
19.7	50.82	55	24.88	225	26.131	301	20.83	185	5.91	71	50.07	7	23.937	308	4
29.7	51.37	50	27.13	266	26.432	284	18.98	170	6.62	67	50.00	45	24.245	291	4
July 9.7	51.87	45	29.79	302	26.716	257	17.28	154	7.29	61	50.45	97	24.536	266	4
19.6	52.32	37	32.81	328	26.973	226	15.74	133	7.90	54	51.42	144	24.802	235	4
29.6	52.69	29	36.09	351	27.199	191	14.41	109	8.44	45	52.86	186	25.037	197	4
Aug. 8.6	52.98	22	39.60	363	27.390	149	13.32	86	8.89	34	54.72	222	25.234	156	3
18.5	53.20	11	43.23	368	27.539	106	12.46	58	9.23	22	56.94	252	25.390	112	3
28.5	53.31	4	46.91	365	27.645	64	11.88	36	9.45	9	59.46	270	25.502	67	3
Sept. 7.5	53.35	4	50.56	355	27.709	22	11.52	11	9.54	1	62.16	280	25.569	24	3
17.5	53.31	12	54.11	338	27.731	16	11.41	9	9.53	14	64.96	279	25.593	16	3
27.4	53.19	20	57.49	313	27.715	50	11.50	29	9.39	26	67.75	266	25.577	51	4
Oct. 7.4	52.99	26	60.62	283	27.665	79	11.79	42	9.13	35	70.41	244	25.526	83	4
17.4	52.73	33	63.45	244	27.586	100	12.21	54	8.78	45	72.85	209	25.443	105	4
27.4	52.40	37	65.89	200	27.486	117	12.75	62	8.33	50	74.94	168	25.338	122	4
Nov. 6.3	52.03	41	67.89	150	27.369	124	13.37	67	7.83	55	76.62	118	25.216	132	4
16.3	51.62	43	69.39	94	27.245	128	14.04	69	7.28	56	77.80	63	25.084	134	4
26.3	51.19	44	70.33	39	27.117	125	14.73	69	6.72	57	78.43	4	24.950	132	4
Dec. 6.2	50.75	45	70.72	22	26.992	117	15.42	65	6.15	55	78.47	53	24.818	125	4
16.2	50.30	43	70.50	80	26.875	106	16.07	61	5.60	50	77.94	110	24.693	111	4
26.2	49.87	40	69.70	137	26.769	91	16.68	53	5.10	45	76.84	165	24.582	96	4
36.2	49.47		68.33		26.678		17.21		4.65		75.19		24.486		4
Mean Place	47.566		26.79		23.374		39.48		2.372		84.74		21.179		6
Sec δ, Tan δ	2.437		+2.223		1.010		−0.141		2.996		−2.824		1.042		–
$D_\psi a$, $D_\omega a$	+0.04		−0.14		+0.06		+0.01		+0.08		+0.18		+0.06		+
$D_\psi \delta$, $D_\omega \delta$	+0.4		−0.3		+0.4		−0.3		+0.4		−0.3		+0.4		–

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	τ Pegasi. Mag. 4.6				b^1 Aquarii. Mag. 4.2				4 Cassiopeiæ. Mag. 5.2				υ Pegasi. Mag. 4.6			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m		° ′		h m		° ′		h m		° ′		h m		° ′	
	23 16		+23 17		23 18		−20 32		23 21		+61 50		23 21		+22 57	
	s		″		s		″		s		″		s		″	
Jan. 1.2	38.099	113	61.70	122	43.559	103	35.66	9	14.25	33	40.23	130	20.663	113	41.90	118
11.2	37.986	98	60.48	140	43.456	85	35.75	14	13.92	31	38.93	180	20.550	99	40.72	136
21.1	37.888	78	59.08	153	43.371	65	35.61	36	13.61	26	37.13	222	20.451	80	39.36	149
31.1	37.810	54	57.55	159	43.306	42	35.25	61	13.35	20	34.91	257	20.371	57	37.87	156
Feb. 10.1	37.756	24	55.96	159	43.264	15	34.64	83	13.15	13	32.34	279	20.314	28	36.31	155
20.1	37.732	9	54.37	151	43.249	15	33.81	107	13.02	6	29.55	292	20.286	4	34.76	148
Mar. 2.0	37.741	45	52.86	136	43.264	47	32.74	128	12.96	2	26.63	292	20.290	42	33.28	133
12.0	37.786	86	51.50	112	43.311	84	31.46	149	12.98	10	23.71	279	20.332	81	31.95	110
22.0	37.872	128	50.38	82	43.395	121	29.97	170	13.08	19	20.92	255	20.413	122	30.85	82
31.9	38.000	169	49.56	51	43.516	159	28.27	185	13.27	27	18.37	222	20.535	165	30.03	49
Apr. 10.9	38.169	208	49.05	12	43.675	196	26.42	200	13.54	35	16.15	180	20.700	204	29.54	12
20.9	38.377	246	48.93	28	43.871	230	24.42	211	13.89	43	14.35	131	20.904	240	29.42	26
30.9	38.623	275	49.21	67	44.101	262	22.31	216	14.32	46	13.04	78	21.144	273	29.68	66
May 10.8	38.898	302	49.88	105	44.363	288	20.15	217	14.78	51	12.26	21	21.417	300	30.34	103
20.8	39.200	319	50.93	139	44.651	309	17.98	211	15.29	54	12.05	34	21.717	317	31.37	138
30.8	39.519	328	52.32	173	44.960	319	15.87	203	15.83	55	12.39	90	22.034	327	32.75	170
June 9.8	39.847	329	54.05	198	45.279	324	13.84	189	16.38	54	13.29	144	22.361	329	34.45	197
19.7	40.176	321	56.03	222	45.603	321	11.95	167	16.92	53	14.73	192	22.690	323	36.42	219
29.7	40.497	304	58.25	236	45.924	307	10.28	144	17.45	49	16.65	234	23.013	305	38.61	233
July 9.7	40.801	282	60.61	246	46.231	287	8.84	117	17.94	46	18.99	273	23.318	284	40.94	244
19.6	41.083	249	63.07	251	46.518	258	7.67	87	18.40	39	21.72	305	23.602	253	43.38	248
29.6	41.332	214	65.58	249	46.776	223	6.80	54	18.79	33	24.77	328	23.855	219	45.86	247
Aug. 8.6	41.546	174	68.07	242	46.999	185	6.26	23	19.12	26	28.05	344	24.074	179	48.33	240
18.6	41.720	132	70.49	230	47.184	142	6.03	8	19.38	20	31.49	356	24.253	138	50.73	228
28.5	41.852	90	72.79	214	47.326	97	6.11	38	19.58	12	35.05	356	24.391	95	53.01	212
Sept. 7.5	41.942	48	74.93	195	47.423	53	6.49	63	19.70	5	38.61	351	24.486	53	55.13	193
17.5	41.990	9	76.88	172	47.476	11	7.12	84	19.75	2	42.12	340	24.539	14	57.06	171
27.5	41.999	28	78.60	148	47.487	28	7.96	100	19.73	9	45.52	320	24.553	22	58.77	147
Oct. 7.4	41.971	59	80.08	120	47.459	62	8.96	110	19.64	16	48.72	293	24.531	53	60.24	121
17.4	41.912	84	81.28	94	47.397	88	10.06	116	19.48	20	51.65	260	24.478	80	61.45	92
27.4	41.828	105	82.22	63	47.309	111	11.22	115	19.28	26	54.25	222	24.398	101	62.37	63
Nov. 6.3	41.723	122	82.85	33	47.198	124	12.37	109	19.02	29	56.47	176	24.297	117	63.00	34
16.3	41.601	130	83.18	4	47.074	132	13.46	98	18.73	33	58.23	126	24.180	128	63.34	5
26.3	41.471	136	83.22	28	46.942	135	14.44	84	18.40	35	59.49	73	24.052	133	63.39	26
Dec. 6.3	41.335	136	82.94	57	46.807	133	15.28	65	18.05	36	60.22	16	23.919	134	63.13	54
16.2	41.199	132	82.37	85	46.674	125	15.93	47	17.69	36	60.38	42	23.785	131	62.59	82
26.2	41.067	125	81.52	110	46.549	113	16.40	24	17.33	35	59.96	99	23.654	125	61.77	106
36.2	40.942		80.42		46.436		16.64		16.98		58.97		23.529		60.71	
Mean Place	37.518		48.21		43.066		34.81		13.896		16.69		20.049		28.51	
Sec δ, Tan δ	1.089		+0.431		1.068		−0.375		2.119		+1.868		1.086		+0.424	
$D_\psi\alpha$, $D_\omega\alpha$	+0.06		−0.03		+0.06		+0.02		+0.05		−0.12		+0.06		−0.03	
$D_\psi\delta$, $D_\omega\delta$	+0.4		−0.2		+0.4		−0.2		+0.4		−0.2		+0.4		−0.2	

FOR THE UPPER TRANSIT AT

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FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	72 Pegasi (*mean*). Mag. 5.2				λ Andromedæ. Mag. 4.0				ι Andromedæ. Mag. 4.3				ι Piscium. Mag. 4.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 23 29		° ′ +30 52		h m 23 33		° ′ +46 1		h m 23 34		° ′ +42 49		h m 23 35		° ′ + 5 11	
	s		″		s		″		s		″		s		″	
Jan. 1.2	56.544	135	57.46	121	36.358	195	29.36	124	10.224	180	29.76	124	47.682	101	21.15	82
11.2	56.409	120	56.25	147	36.163	178	28.12	164	10.044	163	28.52	160	47.581	89	20.33	84
21.1	56.289	102	54.78	169	35.985	153	26.48	198	9.881	142	26.92	191	47.492	73	19.49	82
31.1	56.187	76	53.09	181	35.832	120	24.50	223	9.739	110	25.01	216	47.419	54	18.67	73
Feb. 10.1	56.111	46	51.28	187	35.712	81	22.27	238	9.629	74	22.85	228	47.365	31	17.94	65
20.1	56.065	11	49.41	185	35.631	35	19.89	246	9.555	30	20.57	234	47.334	3	17.29	49
Mar. 2.0	56.054	30	47.56	173	35.596	17	17.43	241	9.525	18	18.23	227	47.331	30	16.80	29
12.0	56.084	73	45.83	153	35.613	73	15.02	226	9.543	71	15.96	212	47.361	66	16.51	8
22.0	56.157	118	44.30	127	35.686	130	12.76	201	9.614	125	13.84	187	47.427	102	16.43	19
Apr. 1.0	56.275	165	43.03	94	35.816	188	10.75	170	9.739	179	11.97	153	47.529	140	16.62	45
10.9	56.440	207	42.09	55	36.004	241	9.05	128	9.918	231	10.44	114	47.669	180	17.07	76
20.9	56.647	248	41.54	14	36.245	291	7.77	84	10.149	279	9.30	70	47.849	215	17.83	102
30.9	56.895	283	41.40	29	36.536	331	6.93	35	10.428	318	8.60	22	48.064	247	18.85	131
May 10.8	57.178	312	41.69	71	36.867	367	6.58	14	10.746	351	8.38	27	48.311	274	20.16	153
20.8	57.490	332	42.40	112	37.234	391	6.72	65	11.097	374	8.65	74	48.585	294	21.69	174
30.8	57.822	344	43.52	151	37.625	404	7.37	112	11.471	386	9.39	121	48.879	309	23.43	189
June 9.8	58.166	347	45.03	183	38.029	405	8.49	158	11.857	390	10.60	164	49.188	313	25.32	200
19.7	58.513	341	46.86	213	38.434	397	10.07	198	12.247	382	12.24	202	49.501	310	27.32	205
29.7	58.854	324	48.99	235	38.831	378	12.05	232	12.629	364	14.26	233	49.811	297	29.37	205
July 9.7	59.178	301	51.34	254	39.209	350	14.37	262	12.993	337	16.59	262	50.108	281	31.42	200
19.7	59.479	270	53.88	264	39.559	314	16.99	284	13.330	303	19.21	282	50.389	254	33.42	190
29.6	59.749	236	56.52	268	39.873	272	19.83	302	13.633	262	22.03	295	50.643	222	35.32	176
Aug. 8.6	59.985	194	59.20	269	40.145	225	22.85	310	13.895	217	24.98	304	50.865	188	37.08	156
18.6	60.179	150	61.89	260	40.370	173	25.95	313	14.112	169	28.02	304	51.053	149	38.64	137
28.5	60.329	107	64.49	250	40.543	122	29.08	310	14.281	119	31.06	299	51.202	109	40.01	113
Sept. 7.5	60.436	63	66.99	234	40.665	71	32.18	299	14.400	71	34.05	288	51.311	70	41.14	91
17.5	60.499	21	69.33	214	40.736	20	35.17	284	14.471	23	36.93	273	51.381	31	42.05	67
27.5	60.520	17	71.47	191	40.756	26	38.01	263	14.494	22	39.66	249	51.412	2	42.72	44
Oct. 7.4	60.503	50	73.38	163	40.730	68	40.64	237	14.472	61	42.15	224	51.410	34	43.16	22
17.4	60.453	80	75.01	135	40.662	106	43.01	205	14.411	96	44.39	193	51.376	59	43.38	3
27.4	60.373	105	76.36	102	40.556	137	45.06	170	14.315	127	46.32	158	51.317	81	43.41	17
Nov. 6.4	60.268	123	77.38	69	40.419	164	46.76	130	14.188	151	47.90	119	51.236	95	43.24	32
16.3	60.145	138	78.07	34	40.255	184	48.06	86	14.037	171	49.09	77	51.141	107	42.92	46
26.3	60.007	145	78.41	1	40.071	200	48.92	41	13.866	184	49.86	34	51.034	113	42.46	59
Dec. 6.3	59.862	151	78.40	38	39.871	207	49.33	6	13.682	192	50.20	12	50.921	116	41.87	70
16.2	59.711	149	78.02	73	39.664	210	49.27	54	13.490	194	50.08	57	50.805	114	41.17	77
26.2	59.562	145	77.29	105	39.454	206	48.73	100	13.296	190	49.51	99	50.691	109	40.40	82
36.2	59.417		76.24		39.248		47.73		13.106		48.52		50.582		39.58	
Mean Place	55.872		41.59		35.687		9.20		9.538		10.40		46.994		13.77	
Sec δ, Tan δ	1.165		+0.598		1.440		+1.036		1.363		+0.927		1.004		+0.091	
$D_{\psi}\alpha$, $D_{\epsilon}\alpha$	+0.06		−0.04		+0.06		−0.07		+0.06		−0.06		+0.06		−0.01	
$D_{\psi}\delta$, $D_{\epsilon}\delta$	+0.4		−0.1		+0.4		−0.1		+0.4		−0.1		+0.4		−0.1	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	γ Cephei. Mag. 3.4				κ Andromedæ. Mag. 4.3				ω² Aquarii. Mag. 4.6				ι¹ Aquarii. Mag. 5.3			
	Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.		Right Ascension.		Declination.	
	h m 23 35		° ′ +77 10		h m 23 36		° ′ +43 53		h m 23 38		° ′ −14 59		h m 23 40		° ′ −18 43	
	s		″		s		″		s		″		s		″	
Jan. 1.2	60.90		74.94		25.535		26.60		31.996		33.45		0.740		36.70	
11.2	60.05	85	74.04	90	25.350	185	25.38	122	31.890	106	33.78	33	0.630	110	36.92	22
21.2	59.26	79	72.57	147	25.181	169	23.79	159	31.796	94	33.91	13	0.532	98	36.93	1
31.1	58.56	70	70.57	200	25.034	147	21.88	191	31.719	77	33.86	5	0.451	81	36.69	24
Feb. 10.1	57.99	57	68.11	246	24.918	116	19.72	216	31.662	57	33.58	28	0.391	60	36.23	46
20.1	57.57	42	65.32	279	24.840	78	17.42	230	31.629	33	33.09	49	0.356	35	35.52	71
Mar. 2.0	57.30	27	62.29	303	24.805	35	15.06	236	31.624	5	32.37	72	0.347	9	34.58	94
12.0	57.22	8	59.16	313	24.820	15	12.74	232	31.650	26	31.42	95	0.372	25	33.40	118
22.0	57.32	10	56.04	312	24.888	68	10.59	215	31.712	62	30.24	118	0.432	60	32.00	140
Apr. 1.0	57.60	28	53.09	295	25.011	123	8.66	193	31.811	99	28.85	139	0.529	97	30.39	161
10.9	58.07	47	50.39	270	25.189	178	7.07	159	31.947	136	27.24	161	0.665	136	28.60	179
20.9	58.70	63	48.05	234	25.420	231	5.87	120	32.122	175	25.46	178	0.840	175	26.64	196
30.9	59.46	76	46.17	188	25.700	280	5.11	76	32.334	212	23.53	193	1.052	212	24.54	210
May 10.8	60.35	89	44.80	137	26.021	321	4.82	29	32.579	245	21.48	205	1.298	246	22.37	217
20.8	61.32	97	43.98	82	26.376	355	5.03	21	32.852	273	19.36	212	1.572	274	20.17	220
30.8	62.35	103	43.74	24	26.754	378	5.72	69	33.147	295	17.23	213	1.871	299	17.98	219
June 9.8	63.40	105	44.08	34	27.146	392	6.88	116	33.458	311	15.14	209	2.184	313	15.87	211
19.7	64.46	106	45.00	92	27.541	395	8.48	160	33.776	318	13.14	200	2.505	321	13.88	199
29.7	65.48	102	46.45	145	27.929	388	10.47	199	34.092	316	11.28	186	2.825	320	12.06	182
July 9.7	66.45	97	48.42	197	28.299	370	12.78	231	34.398	306	9.62	166	3.136	311	10.47	159
19.7	67.33	88	50.84	242	28.642	343	15.39	261	34.687	289	8.17	145	3.430	294	9.14	133
29.6	68.12	79	53.65	281	28.951	309	18.20	281	34.951	264	7.01	116	3.698	268	8.11	103
Aug. 8.6	68.79	67	56.81	316	29.219	268	21.16	296	35.184	233	6.13	88	3.936	238	7.40	71
18.6	69.34	55	60.24	343	29.442	223	24.22	306	35.380	196	5.55	58	4.137	201	7.01	39
28.5	69.74	40	63.85	361	29.616	174	27.28	306	35.537	157	5.28	27	4.297	160	6.95	6
Sept. 7.5	70.00	26	67.58	373	29.739	123	30.30	302	35.651	114	5.30	2	4.414	117	7.18	23
17.5	70.12	12	71.36	378	29.812	73	33.22	292	35.724	73	5.60	30	4.489	75	7.68	50
27.5	70.08	4	75.10	374	29.838	26	35.99	277	35.757	33	6.13	53	4.522	33	8.44	76
Oct. 7.4	69.90	18	78.72	362	29.819	19	38.54	255	35.753	4	6.87	74	4.518	4	9.38	94
17.4	69.59	31	82.14	342	29.759	60	40.84	230	35.715	38	7.75	88	4.478	40	10.45	107
27.4	69.14	45	85.29	315	29.663	96	42.82	198	35.648	67	8.72	97	4.409	69	11.61	116
Nov. 6.4	68.57	57	88.10	281	29.535	128	44.45	163	35.560	88	9.75	103	4.318	91	12.79	118
16.3	67.91	66	90.48	238	29.383	152	45.70	125	35.455	105	10.77	102	4.209	109	13.93	114
26.3	67.16	75	92.35	187	29.209	174	46.52	82	35.337	118	11.75	98	4.087	122	14.99	106
Dec. 6.3	66.33	83	93.68	133	29.022	187	46.90	38	35.214	123	12.64	89	3.959	128	15.92	93
16.2	65.46	87	94.42	74	28.827	195	46.83	7	35.090	124	13.40	76	3.830	129	16.68	76
26.2	64.57	89	94.53	11	28.629	198	46.30	53	34.968	122	14.03	63	3.703	127	17.27	59
36.2	63.70	87	94.00	53	28.434	195	45.34	96	34.854	114	14.49	46	3.585	118	17.66	39
Mean Place	60.740		49.01		24.830		6.96		31.368		33.97		0.125		35.99	
Sec δ, Tan δ	4.509		+4.397		1.388		+0.962		1.035		−0.268		1.056		−0.339	
$D_\psi a$, $D_\omega a$	+0.05		−0.29		+0.06		−0.06		+0.06		+0.02		+0.06		+0.02	
$D_\psi \delta$, $D_\omega \delta$	+0.4		−0.1		+0.4		−0.1		+0.4		−0.1		+0.4		−0.1	

FOR THE UPPER TRANSIT AT WASHINGTON.

Washington Mean Time.	ψ Andromedæ. Mag. 5.1 Right Ascension.		ψ Andromedæ. Declination.		41 H. Cephei. Mag. 5.0 Right Ascension.		41 H. Cephei. Declination.		δ Sculptoris. Mag. 4.6 Right Ascension.		δ Sculptoris. Declination.		φ Pegasi. Mag. 5.2 Right Ascension.		φ Pegasi. Declination.	
	h m 23 42		° ′ +45 58		h m 23 44		° ′ +67 21		h m 23 44		° ′ −28 34		h m 23 48		° ′ +18 40	
	s		″		s		″		s		″		s		″	
Jan. 1.2	1.653	198	33.76	116	2.34	44	48.60	96	43.070	129	46.96	2	22.674	116	25.27	99
11.2	1.455	183	32.60	155	1.90	42	47.64	149	42.941	114	46.94	35	22.558	108	24.28	114
21.2	1.272	160	31.05	189	1.48	37	46.15	199	42.827	97	46.59	66	22.450	94	23.14	124
31.1	1.112	130	29.16	217	1.11	31	44.16	240	42.730	74	45.93	94	22.356	75	21.90	129
Feb. 10.1	0.982	91	26.99	233	0.80	24	41.76	271	42.656	49	44.99	124	22.281	49	20.61	128
20.1	0.891	46	24.66	241	0.56	13	39.05	292	42.607	17	43.75	150	22.232	21	19.33	120
Mar. 2.0	0.845	5	22.25	239	0.43	5	36.13	299	42.590	17	42.25	173	22.211	13	18.13	108
12.0	0.850	61	19.86	226	0.38	6	33.14	295	42.607	54	40.52	196	22.224	52	17.05	87
22.0	0.911	118	17.60	202	0.44	17	30.19	278	42.661	93	38.56	215	22.276	92	16.18	61
Apr. 1.0	1.029	176	15.58	171	0.61	27	27.41	250	42.754	136	36.41	230	22.368	135	15.57	32
10.9	1.205	232	13.87	133	0.88	38	24.91	215	42.890	177	34.11	240	22.503	176	15.25	0
20.9	1.437	282	12.54	89	1.26	45	22.76	170	43.067	217	31.71	247	22.679	215	15.25	36
30.9	1.719	326	11.65	41	1.71	53	21.06	120	43.284	252	29.24	247	22.894	251	15.61	70
May 10.9	2.045	362	11.24	8	2.24	59	19.86	65	43.536	284	26.77	243	23.145	279	16.31	105
20.8	2.407	387	11.32	58	2.83	63	19.21	9	43.820	310	24.34	232	23.424	303	17.36	135
30.8	2.794	403	11.90	105	3.46	65	19.12	49	44.130	327	22.02	216	23.727	317	18.71	164
June 9.8	3.197	407	12.95	150	4.11	65	19.61	102	44.457	337	19.86	195	24.044	324	20.35	187
19.7	3.604	399	14.45	190	4.76	64	20.63	155	44.794	337	17.91	167	24.368	322	22.22	206
29.7	4.003	383	16.35	228	5.40	62	22.18	203	45.131	330	16.24	138	24.690	311	24.28	218
July 9.7	4.386	357	18.63	256	6.02	56	24.21	245	45.461	312	14.86	102	25.001	294	26.46	227
19.7	4.743	322	21.19	280	6.58	51	26.66	282	45.773	288	13.84	65	25.295	267	28.73	228
29.6	5.065	282	23.99	296	7.09	45	29.48	313	46.061	254	13.19	28	25.562	238	31.01	225
Aug. 8.6	5.347	235	26.95	308	7.54	35	32.61	335	46.315	216	12.91	9	25.800	201	33.26	217
18.6	5.582	184	30.03	311	7.89	29	35.96	353	46.531	174	13.00	45	26.001	162	35.43	203
28.6	5.766	134	33.14	309	8.18	20	39.49	361	46.705	128	13.45	78	26.163	123	37.46	189
Sept. 7.5	5.900	83	36.23	299	8.38	11	43.10	362	46.833	82	14.23	108	26.286	83	39.35	169
17.5	5.983	32	39.22	286	8.49	3	46.72	356	46.915	37	15.31	130	26.369	45	41.04	148
27.5	6.015	14	42.08	266	8.52	5	50.28	343	46.952	6	16.61	147	26.414	8	42.52	124
Oct. 7.4	6.001	56	44.74	241	8.47	15	53.71	323	46.946	43	18.08	157	26.422	24	43.76	101
17.4	5.945	93	47.15	210	8.32	21	56.94	293	46.903	77	19.65	159	26.398	51	44.77	76
27.4	5.852	128	49.25	176	8.11	28	59.87	259	46.826	103	21.24	156	26.347	75	45.53	51
Nov. 6.4	5.724	156	51.01	138	7.83	33	62.46	216	46.723	124	22.80	144	26.272	93	46.04	25
16.3	5.568	177	52.39	94	7.50	39	64.62	168	46.599	138	24.24	126	26.179	108	46.29	1
26.3	5.391	194	53.33	50	7.11	42	66.30	116	46.461	146	25.50	105	26.071	119	46.30	24
Dec. 6.3	5.197	205	53.83	3	6.69	45	67.46	59	46.315	148	26.55	77	25.952	124	46.06	48
16.3	4.992	209	53.86	44	6.24	46	68.05	2	46.167	146	27.32	50	25.828	125	45.58	70
26.2	4.783	207	53.42	90	5.78	46	68.03	61	46.021	139	27.82	18	25.703	125	44.88	90
36.2	4.576		52.52		5.32		67.42		45.882		28.00		25.578		43.98	
Mean Place	0.896		13.55		1.674		23.86		42.495		43.15		21.877		13.36	
Sec δ, Tan δ	1.439		+1.035		2.598		+2.398		1.139		−0.545		1.056		+0.338	
Dψα, Dωα	+0.06		−0.07		+0.06		−0.16		+0.06		+0.04		+0.06		−0.02	
Dψδ, Dωδ	+0.4		−0.1		+0.4		−0.1		+0.4		−0.1		+0.4		−0.1	

FOR THE UPPER TRANSIT AT WASHINGTON.

FOR THE UPPER TRANSIT AT WASHINGTON

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	S T Me
		h m s	s	° ′ ″	″	m s	s	′ ″	m s	h
Jan.	1	18 44 37.57	11.052	−23 3 8.6	+11.79	+ 3 25.29	+1.192	16 17.82	1 11.06	18
	2	18 49 2.67	11.039	22 58 12.0	12.93	3 53.76	1.179	16 17.82	1 11.02	18
	3	18 53 27.44	11.024	22 52 47.8	14.07	4 21.89	1.165	16 17.83	1 10.97	18
	4	18 57 51.83	11.007	22 46 56.3	15.21	4 49.65	1.149	16 17.82	1 10.92	18
	5	19 2 15.81	10.990	22 40 37.7	16.34	5 17.00	1.131	16 17.82	1 10.87	18
	6	19 6 39.35	10.971	−22 33 52.2	+17.45	+ 5 43.91	+1.112	16 17.81	1 10.81	19
	7	19 11 2.42	10.951	22 26 40.0	18.56	6 10.35	1.092	16 17.80	1 10.74	19
	8	19 15 24.98	10.929	22 19 1.2	19.66	6 36.28	1.069	16 17.77	1 10.68	19
	9	19 19 47.01	10.906	22 10 56.2	20.75	7 1.68	1.047	16 17.74	1 10.60	19
	10	19 24 8.49	10.883	22 2 25.1	21.83	7 26.53	1.023	16 17.71	1 10.52	19
	11	19 28 29.38	10.858	−21 53 28.3	+22.90	+ 7 50.79	+0.999	16 17.68	1 10.45	19
	12	19 32 49.67	10.832	21 44 6.0	23.95	8 14.46	0.973	16 17.64	1 10.37	19
	13	19 37 9.33	10.806	21 34 18.4	25.00	8 37.51	0.947	16 17.59	1 10.29	19
	14	19 41 28.35	10.779	21 24 5.9	26.04	8 59.91	0.920	16 17.54	1 10.20	19
	15	19 45 46.72	10.751	21 13 28.6	27.07	9 21.67	0.893	16 17.48	1 10.11	19
	16	19 50 4.43	10.723	−21 2 26.9	+28.08	+ 9 42.76	+0.864	16 17.42	1 10.02	19
	17	19 54 21.44	10.695	20 51 1.1	29.07	10 3.16	0.836	16 17.34	1 9.93	19
	18	19 58 37.76	10.665	20 39 11.4	30.06	10 22.86	0.807	16 17.26	1 9.83	19
	19	20 2 53.37	10.636	20 26 58.2	31.04	10 41.87	0.777	16 17.18	1 9.73	19
	20	20 7 8.26	10.605	20 14 21.7	32.00	11 0.15	0.746	16 17.09	1 9.63	19
	21	20 11 22.42	10.574	−20 1 22.5	+32.94	+11 17.70	+0.715	16 16.99	1 9.53	20
	22	20 15 35.83	10.543	19 48 0.7	33.87	11 34.51	0.684	16 16.89	1 9.42	20
	23	20 19 48.49	10.511	19 34 16.8	34.78	11 50.57	0.653	16 16.79	1 9.31	20
	24	20 24 0.39	10.479	19 20 11.0	35.69	12 5.87	0.621	16 16.67	1 9.21	20
	25	20 28 11.51	10.447	19 5 43.7	36.58	12 20.40	0.589	16 16.55	1 9.10	20
	26	20 32 21.87	10.415	−18 50 55.5	+37.44	+12 34.15	+0.557	16 16.43	1 8.98	20
	27	20 36 31.42	10.382	18 35 46.6	38.29	12 47.11	0.523	16 16.31	1 8.87	20
	28	20 40 40.17	10.348	18 20 17.4	39.13	12 59.27	0.490	16 16.18	1 8.76	20
	29	20 44 48.13	10.315	18 4 28.3	39.95	13 10.64	0.457	16 16.05	1 8.64	20
	30	20 48 55.27	10.281	17 48 19.8	40.75	13 21.21	0.423	16 15.92	1 8.53	20
	31	20 53 1.59	10.247	−17 31 52.1	+41.53	+13 30.95	+0.389	16 15.78	1 8.41	20
Feb.	1	20 57 7.10	10.213	17 15 5.9	42.30	13 39.88	0.355	16 15.64	1 8.30	20
	2	21 1 11.78	10.178	16 58 1.4	43.06	13 47.97	0.320	16 15.50	1 8.18	20
	3	21 5 15.63	10.143	16 40 39.1	43.79	13 55.24	0.286	16 15.35	1 8.07	20
	4	21 9 18.64	10.109	16 22 59.5	44.50	14 1.69	0.252	16 15.19	1 7.95	20
	5	21 13 20.82	10.074	−16 5 3.1	+45.20	+14 7.30	+0.217	16 15.04	1 7.84	20
	6	21 17 22.16	10.039	15 46 50.1	45.88	14 12.08	0.182	16 14.89	1 7.73	21
	7	21 21 22.68	10.005	15 28 20.9	46.54	14 16.03	0.148	16 14.73	1 7.61	21
	8	21 25 22.37	9.970	15 9 36.2	47.19	14 19.15	0.114	16 14.56	1 7.50	21
	9	21 29 21.25	9.936	14 50 36.2	47.81	14 21.47	0.080	16 14.39	1 7.39	21
	10	21 33 19.30	9.903	−14 31 21.4	+48.42	+14 22.96	+0.046	16 14.21	1 7.28	21
	11	21 37 16.56	9.869	14 11 52.1	49.02	14 23.67	+0.013	16 14.04	1 7.17	21
	12	21 41 13.04	9.837	13 52 8.7	49.59	14 23.59	−0.020	16 13.86	1 7.06	21
	13	21 45 8.73	9.805	13 32 11.8	50.15	14 22.73	0.052	16 13.67	1 6.95	21
	14	21 49 3.67	9.773	13 12 1.5	50.69	14 21.12	0.083	16 13.48	1 6.84	21
	15	21 52 57.86	9.743	−12 51 38.4	+51.22	+14 18.76	−0.113	16 13.29	1 6.74	21
	16	*21 56 51.32*	9.713	−12 31 2.8	+51.74	+14 15.67	−0.143	16 13.08	1 6.63	21

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0s.19 from the sidereal interva

FOR WASHINGTON APPARENT NOON.

ate.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ′ ″	″	m s	s	′ ″	m s	h m s
16	21 56 51.32	9.713	−12 31 2.8	+51.74	+14 15.67	−0.143	16 13.08	1 6.63	21 42 33.30
17	22 0 44.05	9.683	12 10 15.1	52.23	14 11.87	0.173	16 12.88	1 6.53	21 46 29.85
18	22 4 36.09	9.654	11 49 15.7	52.71	14 7.37	0.202	16 12.67	1 6.43	21 50 26.41
19	22 8 27.45	9.626	11 28 5.2	53.17	14 2.18	0.230	16 12.45	1 6.33	21 54 22.96
20	22 12 18.14	9.598	11 6 43.7	53.61	13 56.33	0.258	16 12.23	1 6.23	21 58 19.52
21	22 16 8.17	9.571	−10 45 11.8	+54.04	+13 49.82	−0.285	16 12.01	1 6.13	22 2 16.07
22	22 19 57.57	9.545	10 23 29.8	54.45	13 42.69	0.311	16 11.78	1 6.04	22 6 12.62
23	22 23 46.33	9.520	10 1 38.1	54.84	13 34.93	0.336	16 11.56	1 5.95	22 10 9.18
24	22 27 34.50	9.495	9 39 37.2	55.22	13 26.56	0.361	16 11.32	1 5.86	22 14 5.73
25	22 31 22.08	9.470	9 17 27.5	55.58	13 17.61	0.385	16 11.09	1 5.77	22 18 2.28
26	22 35 9.08	9.447	− 8 55 9.4	+55.92	+13 8.09	−0.408	16 10.86	1 5.69	22 21 58.84
27	22 38 55.53	9.424	8 32 43.2	56.25	12 58.01	0.431	16 10.62	1 5.60	22 25 55.39
28	22 42 41.42	9.401	8 10 9.4	56.55	12 47.38	0.454	16 10.38	1 5.52	22 29 51.94
1	22 46 26.80	9.380	7 47 28.5	56.84	12 36.23	0.475	16 10.14	1 5.45	22 33 48.50
2	22 50 11.65	9.359	7 24 40.9	57.12	12 24.56	0.496	16 9.90	1 5.38	22 37 45.05
3	22 53 56.00	9.338	− 7 1 47.0	+57.37	+12 12.39	−0.517	16 9.65	1 5.31	22 41 41.60
4	22 57 39.86	9.318	6 38 47.1	57.61	11 59.74	0.537	16 9.41	1 5.24	22 45 38.16
5	23 1 23.26	9.299	6 15 41.9	57.83	11 46.61	0.556	16 9.17	1 5.17	22 49 34.71
6	23 5 6.19	9.280	5 52 31.6	58.03	11 33.03	0.575	16 8.92	1 5.11	22 53 31.26
7	23 8 48.67	9.261	5 29 16.5	58.22	11 19.00	0.593	16 8.68	1 5.05	22 57 27.81
8	23 12 30.73	9.244	− 5 5 57.2	+58.39	+11 4.55	−0.611	16 8.43	1 4.99	23 1 24.37
9	23 16 12.39	9.228	4 42 34.1	58.54	10 49.69	0.627	16 8.18	1 4.93	23 5 20.92
10	23 19 53.66	9.212	4 19 7.4	58.68	10 34.45	0.642	16 7.92	1 4.88	23 9 17.47
11	23 23 34.56	9.197	3 55 37.5	58.80	10 18.84	0.657	16 7.67	1 4.83	23 13 14.02
12	23 27 15.12	9.183	3 32 5.0	58.91	10 2.89	0.671	16 7.41	1 4.78	23 17 10.58
13	23 30 55.36	9.170	− 3 8 30.0	+59.00	+ 9 46.63	−0.684	16 7.15	1 4.74	23 21 7.13
14	23 34 35.30	9.159	2 44 52.9	59.08	9 30.07	0.695	16 6.89	1 4.70	23 25 3.68
15	23 38 14.97	9.148	2 21 14.0	59.15	9 13.23	0.706	16 6.63	1 4.66	23 29 0.23
16	23 41 54.39	9.138	1 57 33.8	59.20	8 56.14	0.717	16 6.36	1 4.62	23 32 56.79
17	23 45 33.59	9.129	1 33 52.5	59.23	8 38.82	0.726	16 6.09	1 4.59	23 36 53.34
18	23 49 12.57	9.121	− 1 10 10.6	+59.25	+ 8 21.31	−0.733	16 5.82	1 4.56	23 40 49.89
19	23 52 51.39	9.114	0 46 28.3	59.26	8 3.62	0.740	16 5.55	1 4.54	23 44 46.44
20	23 56 30.05	9.108	− 0 22 46.1	59.26	7 45.78	0.746	16 5.27	1 4.52	23 48 43.00
21	0 0 8.57	9.103	+ 0 0 55.7	59.23	7 27.80	0.751	16 5.00	1 4.50	23 52 39.55
22	0 3 46.99	9.099	0 24 36.8	59.19	7 9.71	0.756	16 4.72	1 4.48	23 56 36.10
23	0 7 25.31	9.095	+ 0 48 16.9	+59.14	+ 6 51.53	−0.759	16 4.44	1 4.47	0 0 32.65
24	0 11 3.57	9.093	1 11 55.4	59.07	6 33.29	0.761	16 4.16	1 4.45	0 4 29.20
25	0 14 41.78	9.092	1 35 32.2	58.99	6 15.00	0.762	16 3.88	1 4.44	0 8 25.76
26	0 18 19.98	9.091	1 59 6.8	58.89	5 56.69	0.763	16 3.60	1 4.44	0 12 22.31
27	0 21 58.17	9.091	2 22 38.9	58.77	5 38.38	0.763	16 3.31	1 4.44	0 16 18.86
28	0 25 36.37	9.092	+ 2 46 8.2	+58.65	+ 5 20.08	−0.762	16 3.03	1 4.44	0 20 15.41
29	0 29 14.61	9.094	3 9 34.2	58.51	5 1.81	0.760	16 2.75	1 4.44	0 24 11.97
30	0 32 52.89	9.097	3 32 56.5	58.35	4 43.59	0.757	16 2.47	1 4.45	0 28 8.52
31	0 36 31.25	9.100	3 56 14.9	58.17	4 25.45	0.754	16 2.19	1 4.46	0 32 5.07
1	0 40 9.68	9.103	4 19 28.8	57.98	4 7.38	0.751	16 1.92	1 4.47	0 36 1.62
2	0 43 48.20	9.107	+ 4 42 37.9	+57.77	+ 3 49.40	−0.747	16 1.64	1 4.48	0 39 58.18
3	0 47 26.82	9.112	+ 5 5 42.0	+57.55	+ 3 31.52	−0.742	16 1.37	1 4.50	0 43 54.73

Note.—For mean time interval of semidiameter passing meridian, subtract 0s.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	M
		h m s	s	° ′ ″	″	m s	s	′ ″	m s	h
Apr.	1	0 40 9.68	9.103	+ 4 19 28.8	+57.98	+4 7.38	−0.751	16 1.92	1 4.47	0
	2	0 43 48.20	9.107	4 42 37.9	57.77	3 49.40	0.747	16 1.64	1 4.48	0
	3	0 47 26.82	9.112	5 5 42.0	57.55	3 31.52	0.742	16 1.37	1 4.50	0
	4	0 51 5.58	9.118	5 28 40.5	57.32	3 13.77	0.737	16 1.10	1 4.53	0
	5	0 54 44.48	9.124	5 51 33.2	57.07	2 56.16	0.731	16 0.83	1 4.56	0
	6	0 58 23.53	9.130	+ 6 14 19.8	+56.80	+2 38.71	−0.724	16 0.56	1 4.58	0
	7	1 2 2.75	9.138	6 36 59.6	56.52	2 21.43	0.716	16 0.29	1 4.61	0
	8	1 5 42.16	9.147	6 59 32.7	56.23	2 4.33	0.708	16 0.02	1 4.65	1
	9	1 9 21.79	9.156	7 21 58.7	55.92	1 47.44	0.699	15 59.75	1 4.68	1
	10	1 13 1.64	9.165	7 44 17.0	55.60	1 30.78	0.689	15 59.49	1 4.72	1
	11	1 16 41.73	9.176	+ 8 6 27.5	+55.27	+1 14.38	−0.678	15 59.22	1 4.76	1
	12	1 20 22.10	9.188	8 28 29.9	54.93	0 58.24	0.666	15 58.95	1 4.80	1
	13	1 24 2.75	9.200	8 50 23.7	54.56	0 42.38	0.654	15 58.68	1 4.84	1
	14	1 27 43.71	9.214	9 12 8.7	54.19	0 26.83	0.641	15 58.42	1 4.89	1
	15	1 31 25.00	9.227	9 33 44.6	53.79	+0 11.60	0.627	15 58.15	1 4.94	1
	16	1 35 6.63	9.242	+ 9 55 10.9	+53.39	−0 3.27	−0.613	15 57.88	1 4.99	1
	17	1 38 48.63	9.258	10 16 27.6	52.98	0 17.79	0.597	15 57.61	1 5.04	1
	18	1 42 31.01	9.274	10 37 34.2	52.56	0 31.93	0.580	15 57.35	1 5.10	1
	19	1 46 13.79	9.291	10 58 30.3	52.12	0 45.66	0.563	15 57.08	1 5.16	1
	20	1 49 56.98	9.309	11 19 15.7	51.66	0 58.99	0.546	15 56.81	1 5.22	1
	21	1 53 40.60	9.327	+11 39 49.9	+51.19	−1 11.89	−0.528	15 56.55	1 5.28	1
	22	1 57 24.67	9.346	12 0 12.8	50.71	1 24.34	0.509	15 56.28	1 5.34	1
	23	2 1 9.21	9.365	12 20 23.9	50.21	1 36.33	0.490	15 56.02	1 5.41	2
	24	2 4 54.21	9.385	12 40 23.0	49.70	1 47.84	0.470	15 55.76	1 5.47	2
	25	2 8 39.71	9.406	13 0 9.6	49.18	1 58.87	0.450	15 55.51	1 5.54	2
	26	2 12 25.70	9.427	+13 19 43.6	+48.64	−2 9.40	−0.428	15 55.26	1 5.61	2
	27	2 16 12.20	9.448	13 39 4.5	48.09	2 19.42	0.407	15 55.00	1 5.68	2
	28	2 19 59.22	9.470	13 58 11.9	47.53	2 28.93	0.386	15 54.75	1 5.76	2
	29	2 23 46.75	9.491	14 17 5.6	46.94	2 37.93	0.364	15 54.51	1 5.84	2
	30	2 27 34.80	9.513	14 35 45.1	46.34	2 46.41	0.342	15 54.26	1 5.91	2
May	1	2 31 23.38	9.535	+14 54 10.2	+45.74	−2 54.37	−0.320	15 54.02	1 5.99	2
	2	2 35 12.49	9.557	15 12 20.5	45.12	3 1.79	0.298	15 53.79	1 6.07	2
	3	2 39 2.12	9.579	15 30 15.8	44.48	3 8.69	0.276	15 53.56	1 6.15	2
	4	2 42 52.29	9.602	15 47 55.5	43.83	3 15.06	0.254	15 53.33	1 6.23	2
	5	2 46 42.99	9.624	16 5 19.6	43.17	3 20.89	0.232	15 53.10	1 6.31	2
	6	2 50 34.24	9.647	+16 22 27.7	+42.49	−3 26.19	−0.209	15 52.88	1 6.39	2
	7	2 54 26.03	9.670	16 39 19.3	41.80	3 30.94	0.186	15 52.66	1 6.47	2
	8	2 58 18.37	9.692	16 55 54.4	41.11	3 35.15	0.164	15 52.45	1 6.55	3
	9	3 2 11.26	9.715	17 12 12.4	40.39	3 38.80	0.141	15 52.24	1 6.64	3
	10	3 6 4.71	9.739	17 28 13.2	39.66	3 41.90	0.117	15 52.03	1 6.72	3
	11	3 9 58.72	9.762	+17 43 56.5	+38.93	−3 44.44	−0.094	15 51.82	1 6.80	3
	12	3 13 53.30	9.786	17 59 22.1	38.19	3 46.40	0.070	15 51.61	1 6.88	3
	13	3 17 48.44	9.809	18 14 29.5	37.43	3 47.81	0.047	15 51.41	1 6.97	3
	14	3 21 44.16	9.833	18 29 18.5	36.65	3 48.65	−0.023	15 51.20	1 7.05	3
	15	3 25 40.45	9.857	18 43 49.0	35.87	3 48.92	+0.001	15 51.00	1 7.13	3
	16	3 29 37.31	9.881	+18 58 0.6	+35.08	−3 48.61	+0.025	15 50.80	1 7.21	3
	17	3 33 34.75	9.905	+19 11 52.9	+34.27	−3 47.73	+0.019	15 50.60	1 7.29	3

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0s.18 from the sidereal interv

FOR WASHINGTON APPARENT NOON.

ate.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ′ ″	″	m s	s	′ ″	m s	h m s
17	3 33 34.75	9.905	+19 11 52.9	+34.27	−3 47.73	+0.049	15 50.60	1 7.29	3 37 23.11
18	3 37 32.76	9.929	19 25 25.7	33.45	3 46.28	0.072	15 50.40	1 7.37	3 41 19.66
19	3 41 31.34	9.953	19 38 38.9	32.63	3 44.26	0.096	15 50.21	1 7.45	3 45 16.22
20	3 45 30.49	9.976	19 51 32.1	31.80	3 41.67	0.120	15 50.02	1 7.53	3 49 12.77
21	3 49 30.21	10.000	20 4 5.0	30.95	3 38.52	0.143	15 49.83	1 7.60	3 53 9.33
22	3 53 30.49	10.023	+20 16 17.5	+30.08	−3 34.80	+0.166	15 49.64	1 7.68	3 57 5.88
23	3 57 31.33	10.046	20 28 9.3	29.21	3 30.53	0.189	15 49.46	1 7.75	4 1 2.44
24	4 1 32.72	10.069	20 39 40.0	28.34	3 25.71	0.212	15 49.28	1 7.82	4 4 59.00
25	4 5 34.63	10.091	20 50 49.4	27.45	3 20.37	0.234	15 49.11	1 7.89	4 8 55.55
26	4 9 37.07	10.112	21 1 37.4	26.55	3 14.50	0.255	15 48.94	1 7.96	4 12 52.11
27	4 13 40.03	10.133	+21 12 3.6	+25.64	−3 8.12	+0.276	15 48.78	1 8.03	4 16 48.67
28	4 17 43.47	10.153	21 22 7.9	24.72	3 1.25	0.296	15 48.62	1 8.09	4 20 45.22
29	4 21 47.40	10.173	21 31 50.1	23.79	2 53.90	0.315	15 48.47	1 8.16	4 24 41.78
30	4 25 51.78	10.192	21 41 9.9	22.85	2 46.10	0.334	15 48.32	1 8.22	4 28 38.34
31	4 29 56.59	10.209	21 50 7.1	21.91	2 37.87	0.352	15 48.18	1 8.28	4 32 34.89
1	4 34 1.82	10.226	+21 58 41.5	+20.95	−2 29.21	+0.368	15 48.04	1 8.34	4 36 31.45
2	4 38 7.45	10.242	22 6 52.9	19.99	2 20.17	0.384	15 47.90	1 8.40	4 40 28.01
3	4 42 13.45	10.257	22 14 41.3	19.03	2 10.75	0.400	15 47.77	1 8.46	4 44 24.56
4	4 46 19.81	10.272	22 22 6.4	18.06	2 0.98	0.414	15 47.65	1 8.51	4 48 21.12
5	4 50 26.51	10.286	22 29 7.9	17.07	1 50.87	0.428	15 47.53	1 8.56	4 52 17.68
6	4 54 33.54	10.299	+22 35 45.9	+16.09	−1 40.43	+0.442	15 47.41	1 8.61	4 56 14.23
7	4 58 40.86	10.311	22 42 0.2	15.10	1 29.69	0.454	15 47.30	1 8.65	5 0 10.79
8	5 2 48.47	10.322	22 47 50.6	14.10	1 18.66	0.465	15 47.19	1 8.69	5 4 7.35
9	5 6 56.35	10.333	22 53 16.9	13.10	1 7.36	0.476	15 47.09	1 8.73	5 8 3.90
10	5 11 4.49	10.344	22 58 19.2	12.09	0 55.82	0.486	15 46.98	1 8.77	5 12 0.46
11	5 15 12.86	10.353	+23 2 57.3	+11.08	−0 44.04	+0.495	15 46.88	1 8.80	5 15 57.02
12	5 19 21.44	10.362	23 7 10.9	10.06	0 32.06	0.504	15 46.79	1 8.83	5 19 53.58
13	5 23 30.21	10.369	23 11 0.3	9.04	0 19.87	0.511	15 46.69	1 8.85	5 23 50.13
14	5 27 39.17	10.376	23 14 25.1	8.02	−0 7.51	0.518	15 46.60	1 8.87	5 27 46.69
15	5 31 48.27	10.382	23 17 25.3	7.00	+0 5.01	0.524	15 46.51	1 8.89	5 31 43.25
16	5 35 57.52	10.388	+23 20 0.9	+ 5.97	+0 17.67	+0.530	15 46.43	1 8.91	5 35 39.81
17	5 40 6.89	10.393	23 22 11.8	4.94	0 30.44	0.534	15 46.35	1 8.92	5 39 36.36
18	5 44 16.36	10.396	23 23 58.0	3.91	0 43.31	0.538	15 46.28	1 8.93	5 43 32.92
19	5 48 25.91	10.400	23 25 19.3	2.87	0 56.27	0.541	15 46.21	1 8.94	5 47 29.48
20	5 52 35.52	10.401	23 26 15.9	1.84	1 9.29	0.543	15 46.14	1 8.94	5 51 26.04
21	5 56 45.15	10.402	+23 26 47.7	+ 0.81	+1 22.34	+0.544	15 46.07	1 8.94	5 55 22.59
22	6 0 54.80	10.402	23 26 54.5	− 0.23	1 35.39	0.544	15 46.01	1 8.94	5 59 19.15
23	6 5 4.44	10.401	23 26 36.4	1.27	1 48.45	0.543	15 45.95	1 8.94	6 3 15.71
24	6 9 14.05	10.398	23 25 53.6	2.30	2 1.46	0.540	15 45.90	1 8.93	6 7 12.27
25	6 13 23.59	10.395	23 24 46.0	3.33	2 14.40	0.537	15 45.85	1 8.91	6 11 8.82
26	6 17 33.04	10.391	+23 23 13.7	− 4.36	+2 27.25	+0.533	15 45.81	1 8.90	6 15 5.38
27	6 21 42.36	10.386	23 21 16.7	5.39	2 39.98	0.528	15 45.78	1 8.88	6 19 1.94
28	6 25 51.53	10.379	23 18 55.0	6.42	2 52.57	0.521	15 45.75	1 8.85	6 22 58.50
29	6 30 0.53	10.370	23 16 8.7	7.44	3 4.98	0.512	15 45.73	1 8.82	6 26 55.05
30	6 34 9.32	10.361	23 12 58.0	8.46	3 17.17	0.503	15 45.71	1 8.79	6 30 51.61
1	6 38 17.88	10.351	+23 9 22.8	− 9.47	+3 29.13	+0.493	15 45.70	1 8.76	6 34 48.17
2	6 42 26.17	10.339	+23 5 23.4	−10.48	+3 40.84	+0.482	15 45.69	1 8.73	6 38 44.72

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0s.19 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	Sidere Time o Mean No
		h m s	s	° ′ ″	″	m s	s	′ ″	m s	h m
July	1	6 38 17.88	10.351	+23 9 22.8	−9.47	+3 29.13	+0.496	15 45.70	1 8.76	6 34 48
	2	6 42 26.17	10.339	23 5 23.4	10.48	3 40.84	0.483	15 45.69	1 8.73	6 38 44
	3	6 46 34.19	10.327	23 0 59.8	11.48	3 52.27	0.470	15 45.69	1 8.69	6 42 41
	4	6 50 41.90	10.314	22 56 12.2	12.48	4 3.40	0.457	15 45.69	1 8.65	6 46 37
	5	6 54 49.29	10.301	22 51 0.6	13.48	4 14.20	0.443	15 45.70	1 8.61	6 50 34
	6	6 58 56.32	10.286	+22 45 25.1	−14.47	+4 24.65	+0.428	15 45.71	1 8.56	6 54 30
	7	7 3 3.00	10.271	22 39 26.0	15.45	4 34.75	0.413	15 45.73	1 8.51	6 58 27
	8	7 7 9.31	10.254	22 33 3.4	16.43	4 44.46	0.397	15 45.76	1 8.46	7 2 24
	9	7 11 15.22	10.237	22 26 17.4	17.40	4 53.79	0.380	15 45.79	1 8.41	7 6 20
	10	7 15 20.71	10.220	22 19 8.2	18.37	5 2.70	0.362	15 45.81	1 8.35	7 10 17
	11	7 19 25.78	10.202	+22 11 35.8	−19.32	+5 11.18	+0.344	15 45.84	1 8.29	7 14 13
	12	7 23 30.40	10.183	22 3 40.6	20.27	5 19.22	0.326	15 45.88	1 8.23	7 18 10
	13	7 27 34.57	10.164	21 55 22.7	21.22	5 26.83	0.307	15 45.91	1 8.17	7 22 6
	14	7 31 38.28	10.145	21 46 42.2	22.15	5 33.95	0.287	15 45.95	1 8.10	7 26 3
	15	7 35 41.51	10.125	21 37 39.3	23.08	5 40.61	0.268	15 46.00	1 8.03	7 29 59
	16	7 39 44.27	10.105	+21 28 14.3	−24.00	+5 46.79	+0.247	15 46.04	1 7.96	7 33 56
	17	7 43 46.52	10.084	21 18 27.3	24.91	5 52.48	0.227	15 46.09	1 7.89	7 37 53
	18	7 47 48.27	10.063	21 8 18.6	25.81	5 57.66	0.206	15 46.15	1 7.82	7 41 49
	19	7 51 49.51	10.041	20 57 48.1	26.71	6 2.33	0.184	15 46.21	1 7.74	7 45 46
	20	7 55 50.24	10.019	20 46 56.5	27.59	6 6.49	0.162	15 46.27	1 7.66	7 49 42
	21	7 59 50.44	9.997	+20 35 43.8	−28.47	+6 10.11	+0.140	15 46.33	1 7.58	7 53 39
	22	8 3 50.09	9.974	20 24 10.1	29.33	6 13.20	0.117	15 46.41	1 7.50	7 57 35
	23	8 7 49.19	9.951	20 12 16.0	30.18	6 15.74	0.094	15 46.49	1 7.42	8 1 32
	24	8 11 47.73	9.927	20 0 1.5	31.02	6 17.72	0.071	15 46.57	1 7.33	8 5 28
	25	8 15 45.70	9.904	19 47 26.9	31.86	6 19.13	0.047	15 46.65	1 7.25	8 9 25
	26	8 19 43.09	9.879	+19 34 32.5	−32.67	+6 19.97	+0.023	15 46.74	1 7.17	8 13 22
	27	8 23 39.88	9.854	19 21 18.6	33.48	6 20.20	−0.002	15 46.84	1 7.08	8 17 18
	28	8 27 36.08	9.829	19 7 45.6	34.27	6 19.84	0.027	15 46.94	1 7.00	8 21 15
	29	8 31 31.67	9.803	18 53 53.6	35.06	6 18.88	0.053	15 47.05	1 6.91	8 25 11
	30	8 35 26.64	9.777	18 39 43.0	35.82	6 17.30	0.079	15 47.17	1 6.83	8 29 8
	31	8 39 20.99	9.751	+18 25 14.1	−36.58	+6 15.11	−0.105	15 47.29	1 6.74	8 33 4
Aug.	1	8 43 14.73	9.725	18 10 27.1	37.33	6 12.29	0.131	15 47.41	1 6.65	8 37 1
	2	8 47 7.84	9.699	17 55 22.4	38.06	6 8.85	0.157	15 47.54	1 6.57	8 40 57
	3	8 51 0.32	9.674	17 40 0.2	38.78	6 4.79	0.182	15 47.67	1 6.48	8 44 54
	4	8 54 52.18	9.648	17 24 20.9	39.49	6 0.11	0.208	15 47.81	1 6.39	8 48 51
	5	8 58 43.42	9.622	+17 8 24.6	−40.16	+5 54.80	−0.234	15 47.95	1 6.31	8 52 47
	6	9 2 34.04	9.596	16 52 11.8	40.87	5 48.89	0.259	15 48.09	1 6.22	8 56 44
	7	9 6 24.05	9.571	16 35 42.7	41.54	5 42.36	0.284	15 48.24	1 6.14	9 0 40
	8	9 10 13.45	9.546	16 18 57.5	42.21	5 35.22	0.309	15 48.39	1 6.05	9 4 37
	9	9 14 2.24	9.521	16 1 56.7	42.86	5 27.49	0.334	15 48.54	1 5.96	9 8 33
	10	9 17 50.45	9.497	+15 44 40.5	−43.49	+5 19.17	−0.359	15 48.70	1 5.88	9 12 30
	11	9 21 38.08	9.473	15 27 9.0	44.12	5 10.27	0.383	15 48.85	1 5.80	9 16 26
	12	9 25 25.14	9.449	15 9 22.8	44.73	5 0.80	0.406	15 49.01	1 5.72	9 20 23
	13	9 29 11.64	9.426	14 51 22.0	45.33	4 50.77	0.429	15 49.18	1 5.63	9 24 20
	14	9 32 57.58	9.403	14 33 6.9	45.91	4 40.19	0.452	15 49.35	1 5.55	9 28 16
	15	9 36 43.00	9.382	+14 14 37.8	−46.49	+4 29.09	−0.474	15 49.52	1 5.47	9 32 13
	16	*9 40 27.90*	9.360	+13 55 55.0	−47.06	+4 17.46	−0.495	15 49.69	1 5.40	9 36 9

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0s.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

ate.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ′ ″	″	m s	s	′ ″	m s	h m s
. 16	9 40 27.90	9.360	+13 55 55.0	−47.06	+ 4 17.46	−0.495	15 49.69	1 5.40	9 36 9.74
17	9 44 12.28	9.339	13 36 58.9	47.62	4 5.32	0.516	15 49.86	1 5.32	9 40 6.29
18	9 47 56.17	9.319	13 17 49.6	48.15	3 52.67	0.536	15 50.03	1 5.25	9 44 2.85
19	9 51 39.56	9.299	12 58 27.6	48.67	3 39.56	0.556	15 50.21	1 5.18	9 47 59.40
20	9 55 22.48	9.279	12 38 53.2	49.19	3 25.97	0.576	15 50.40	1 5.11	9 51 55.95
21	9 59 4.95	9.260	+12 19 6.6	−49.68	+ 3 11.91	−0.595	15 50.58	1 5.04	9 55 52.51
22	10 2 46.94	9.241	11 59 8.3	50.16	2 57.40	0.614	15 50.77	1 4.97	9 59 49.06
23	10 6 28.49	9.222	11 38 58.6	50.64	2 42.43	0.633	15 50.97	1 4.90	10 3 45.61
24	10 10 9.61	9.204	11 18 37.7	51.09	2 27.04	0.650	15 51.17	1 4.83	10 7 42.17
25	10 13 50.30	9.186	10 58 6.2	51.53	2 11.22	0.668	15 51.37	1 4.77	10 11 38.72
26	10 17 30.57	9.169	+10 37 24.2	−51.96	+ 1 54.98	−0.685	15 51.58	1 4.71	10 15 35.27
27	10 21 10.43	9.153	10 16 32.2	52.37	1 38.34	0.702	15 51.79	1 4.65	10 19 31.83
28	10 24 49.91	9.137	9 55 30.4	52.78	1 21.30	0.718	15 52.01	1 4.60	10 23 28.38
29	10 28 28.99	9.121	9 34 19.2	53.16	1 3.88	0.733	15 52.23	1 4.54	10 27 24.93
30	10 32 7.71	9.106	9 12 58.9	53.53	0 46.09	0.748	15 52.46	1 4.49	10 31 21.49
31	10 35 46.07	9.091	+ 8 51 29.9	−53.88	+ 0 27.96	−0.763	15 52.69	1 4.44	10 35 18.04
t. 1	10 39 24.09	9.077	8 29 52.6	54.22	+ 0 9.48	0.777	15 52.92	1 4.39	10 39 14.59
2	10 43 1.80	9.064	8 8 7.1	54.56	− 0 9.33	0.790	15 53.15	1 4.35	10 43 11.15
3	10 46 39.18	9.052	7 46 13.8	54.88	0 28.44	0.802	15 53.39	1 4.31	10 47 7.70
4	10 50 16.28	9.041	7 24 13.2	55.17	0 47.83	0.813	15 53.62	1 4.27	10 51 4.25
5	10 53 53.12	9.030	+ 7 2 5.4	−55.47	− 1 7.50	−0.824	15 53.86	1 4.23	10 55 0.80
6	10 57 29.69	9.019	6 39 50.7	55.75	1 27.43	0.835	15 54.11	1 4.20	10 58 57.36
7	11 1 6.04	9.010	6 17 29.7	56.01	1 47.58	0.844	15 54.35	1 4.16	11 2 53.91
8	11 4 42.16	9.001	5 55 2.3	56.26	2 7.95	0.853	15 54.59	1 4.14	11 6 50.46
9	11 8 18.10	8.994	5 32 29.0	56.50	2 28.51	0.860	15 54.84	1 4.12	11 10 47.02
10	11 11 53.87	8.988	+ 5 9 50.3	−56.73	− 2 49.23	−0.866	15 55.09	1 4.10	11 14 43.57
11	11 15 29.50	8.982	4 47 6.1	56.94	3 10.10	0.872	15 55.33	1 4.07	11 18 40.12
12	11 19 5.01	8.977	4 24 17.1	57.14	3 31.08	0.877	15 55.58	1 4.06	11 22 36.67
13	11 22 40.42	8.974	4 1 23.4	57.33	3 52.17	0.880	15 55.83	1 4.04	11 26 33.22
14	11 26 15.75	8.972	3 38 25.1	57.51	4 13.32	0.882	15 56.08	1 4.03	11 30 29.78
15	11 29 51.04	8.970	+ 3 15 22.9	−57.67	− 4 34.53	−0.884	15 56.33	1 4.02	11 34 26.33
16	11 33 26.30	8.969	2 52 17.0	57.82	4 55.77	0.885	15 56.58	1 4.01	11 38 22.88
17	11 37 1.55	8.969	2 29 7.6	57.96	5 17.02	0.885	15 56.84	1 4.01	11 42 19.43
18	11 40 36.80	8.969	2 5 55.3	58.08	5 38.26	0.885	15 57.09	1 4.01	11 46 15.99
19	11 44 12.09	8.971	1 42 40.2	58.18	5 59.47	0.883	15 57.35	1 4.01	11 50 12.54
20	11 47 47.42	8.974	+ 1 19 22.8	−58.27	− 6 20.63	−0.880	15 57.61	1 4.01	11 54 9.09
21	11 51 22.82	8.977	0 56 3.3	58.34	6 41.72	0.877	15 57.87	1 4.02	11 58 5.64
22	11 54 58.30	8.981	0 32 42.3	58.40	7 2.73	0.873	15 58.14	1 4.03	12 2 2.20
23	11 58 33.88	8.985	+ 0 9 19.9	58.45	7 23.65	0.869	15 58.40	1 4.05	12 5 58.75
24	12 2 9.58	8.990	− 0 14 3.4	58.48	7 44.45	0.864	15 58.67	1 4.07	12 9 55.30
25	12 5 45.41	8.996	− 0 37 27.2	−58.50	− 8 5.12	−0.858	15 58.94	1 4.09	12 13 51.85
26	12 9 21.38	9.002	1 0 51.2	58.50	8 25.64	0.852	15 59.21	1 4.12	12 17 48.40
27	12 12 57.52	9.010	1 24 15.0	58.48	8 45.99	0.844	15 59.49	1 4.15	12 21 44.96
28	12 16 33.85	9.018	1 47 38.2	58.45	9 6.16	0.836	15 59.77	1 4.18	12 25 41.51
29	12 20 10.38	9.027	2 11 0.6	58.41	9 26.12	0.827	16 0.05	1 4.21	12 29 38.06
30	12 23 47.14	9.036	− 2 34 21.8	−58.35	− 9 45.87	−0.818	16 0.33	1 4.25	12 33 34.61
. 1	12 27 24.14	9.047	− 2 57 41.4	−58.27	−10 5.38	−0.807	16 0.61	1 4.29	12 37 31.17

NOTE.—For mean time interval of semidiameter passing meridian, subtract 0s.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

Date.		Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Semi. Pass. Merid.	Sidereal Time of Mean Noon
		h m s	s	° ′ ″	″	m s	s	′ ″	m s	h m s
Oct.	1	12 27 24.14	9.047	− 2 57 41.4	−58.27	−10 5.38	−0.807	16 0.61	1 4.29	12 37 31.
	2	12 31 1.40	9.059	3 20 59.1	58.19	10 24.62	0.795	16 0.89	1 4.33	12 41 27.
	3	12 34 38.94	9.071	3 44 14.5	58.09	10 43.57	0.783	16 1.17	1 4.37	12 45 24
	4	12 38 16.77	9.083	4 7 27.3	57.97	11 2.24	0.771	16 1.45	1 4.4[illegible]	12 49 [illegible]
	5	12 41 54.93	9.097	4 30 37.0	57.84	11 20.58	0.757	16 1.74	1 4.48	12 5[illegible]
	6	12 45 33.44	9.112	− 4 53 43.5	−57.69	−11 38.57	−0.743	16 2.02	1 4 53	[illegible]
	7	12 49 12.31	9.128	5 16 46.1	57.52	11 56.21	0.727	16 2.30	1 4.59	13 [illegible]
	8	12 52 51.57	9.145	5 39 44.8	57.35	12 13.46	0.710	16 2.57	1 4.65	[illegible]
	9	12 56 31.24	9.162	6 2 39.2	57.17	12 30.29	0.692	16 2.85	1 4.71	13 9 3.
	10	13 0 11.35	9.181	6 25 28.9	56.97	12 46.68	0.674	16 3.13	1 4.77	13 13 0.
	11	13 3 51.92	9.200	− 6 48 13.4	−56.74	−13 2.62	−0.654	16 3.40	1 4.84	13 16 56.
	12	13 7 32.98	9.221	7 10 52.7	56.51	13 18.07	0.633	16 3.68	1 4.91	13 20 53.
	13	13 11 14.55	9.243	7 33 26.1	56.26	13 33.02	0.611	16 3.95	1 4.99	13 24 49.
	14	13 14 56.64	9.266	7 55 53.5	56.00	13 47.44	0.589	16 4.22	1 5.07	13 28 46.
	15	13 18 39.29	9.289	8 18 14.4	55.73	14 1.30	0.566	16 4.48	1 5.15	13 32 42.
	16	13 22 22.52	9.313	− 8 40 28.3	−55.43	−14 14.60	−0.542	16 4.75	1 5.23	13 36 39.
	17	13 26 6.33	9.338	9 2 35.0	55.12	14 27.31	0.517	16 5.02	1 5.31	13 40 36.
	18	13 29 50.74	9.364	9 24 33.9	54.79	14 39.42	0.491	16 5.29	1 5.40	13 44 32.
	19	13 33 35.77	9.390	9 46 24.8	54.45	14 50.91	0.465	16 5.55	1 5.49	13 48 29.
	20	13 37 21.43	9.416	10 8 7.2	54.09	15 1.77	0.439	16 5.82	1 5.58	13 52 25.
	21	13 41 7.74	9.443	−10 29 40.8	−53.71	−15 11.98	−0.412	16 6.09	1 5.67	13 56 22.
	22	13 44 54.71	9.471	10 51 5.1	53.31	15 21.53	0.384	16 6.35	1 5.77	14 0 18.
	23	13 48 42.36	9.500	11 12 19.7	52.90	15 30.41	0.356	16 6.62	1 5.86	14 4 15
	24	13 52 30.70	9.528	11 33 24.2	52.47	15 38.62	0.327	16 6.88	1 5.96	14 8 11
	25	13 56 19.73	9.557	11 54 18.1	52.02	15 46.12	0.298	16 7.15	1 6.07	14 12 8
	26	14 0 9.46	9.587	−12 15 1.1	−51.56	−15 52.92	−0.269	16 7.42	1 6.17	14 16 4
	27	14 3 59.90	9.617	12 35 32.8	51.08	15 59.00	0.239	16 7.68	1 6.27	14 20 1
	28	14 7 51.08	9.648	12 55 52.7	50.58	16 4.37	0.208	16 7.95	1 6.38	14 23 58
	29	14 11 43.00	9.679	13 16 0.5	50.06	16 8.99	0.177	16 8.21	1 6.49	14 27 54.
	30	14 15 35.67	9.711	13 35 55.8	49.53	16 12.87	0.146	16 8.47	1 6.60	14 31 51.
	31	14 19 29.09	9.742	−13 55 38.0	−48.98	−16 15.99	−0.114	16 8.73	1 6.72	14 35 47.
Nov.	1	14 23 23.28	9.774	14 15 7.0	48.41	16 18.35	0.082	16 8.99	1 6.83	14 39 44.
	2	14 27 18.25	9.807	14 34 22.1	47.83	16 19.93	0.050	16 9.25	1 6.94	14 43 40.
	3	14 31 14.00	9.839	14 53 23.0	47.24	16 20.73	−0.017	16 9.50	1 7.06	14 47 37.
	4	14 35 10.54	9.873	15 12 9.4	46.62	16 20.74	+0.016	16 9.74	1 7.18	14 51 33.
	5	14 39 7.89	9.906	−15 30 40.8	−45.98	−16 19.95	+0.050	16 9.99	1 7.30	14 55 30.
	6	14 43 6.05	9.940	15 48 56.9	45.34	16 18.35	0.084	16 10.24	1 7.41	14 59 27.
	7	14 47 5.04	9.975	16 6 57.2	44.68	16 15.92	0.118	16 10.48	1 7.53	15 3 23.
	8	14 51 4.87	10.011	16 24 41.3	43.99	16 12.65	0.153	16 10.71	1 7.65	15 7 20.
	9	14 55 5.56	10.046	16 42 8.9	43.30	16 8.54	0.189	16 10.95	1 7.77	15 11 16.
	10	14 59 7.09	10.082	−16 59 19.7	−42.59	−16 3.58	+0.225	16 11.18	1 7.89	15 15 13.
	11	15 3 9.48	10.118	17 16 13.1	41.85	15 57.75	0.261	16 11.40	1 8.01	15 19 9.
	12	15 7 12.75	10.154	17 32 48.8	41.11	15 51.06	0.297	16 11.62	1 8.13	15 23 6.
	13	15 11 16.89	10.191	17 49 6.4	40.35	15 43.50	0.333	16 11.83	1 8.25	15 27 2.
	14	15 15 21.89	10.227	18 5 5.5	39.57	15 35.07	0.370	16 12.04	1 8.37	15 30 59.
	15	15 19 27.77	10.263	−18 20 45.8	−38.78	−15 25.77	+0.406	16 12.25	1 8.48	15 34 56.
	16	15 23 34.53	10.299	−18 36 6.7	−37.96	−15 15.60	+0.442	16 12.46	1 8.60	15 38 52.

Note.—For mean time interval of semidiameter passing meridian, subtract 0s.18 from the sidereal interval.

FOR WASHINGTON APPARENT NOON.

ate.	Apparent Right Ascension.	Var. per Hour.	Apparent Declination.	Var. per Hour.	Equation of Time. Mean—App.	Var. per Hour.	Semi-diameter.	S. T. of Sem. Pass. Merid.	Sidereal Time of Mean Noon.
	h m s	s	° ′ ″	″	m s	s	′ ″	m s	h m s
16	15 23 34.53	10.299	−18 36 6.7	−37.96	−15 15.60	+0.442	16 12.46	1 8.60	15 38 52.63
17	15 27 42.14	10.335	18 51 7.8	37.13	15 4.57	0.477	16 12.66	1 8.72	15 42 49.19
18	15 31 50.60	10.370	19 5 48.9	36.28	14 52.69	0.512	16 12.87	1 8.83	15 46 45.75
19	15 35 59.92	10.405	19 20 9.5	35.42	14 39.96	0.547	16 13.07	1 8.94	15 50 42.30
20	15 40 10.08	10.440	19 34 9.1	34.54	14 26.41	0.582	16 13.26	1 9.06	15 54 38.86
21	15 44 21.06	10.474	−19 47 47.6	−33.65	−14 12.02	+0.616	16 13.46	1 9.17	15 58 35.41
22	15 48 32.86	10.508	20 1 4.4	32.75	13 56.82	0.650	16 13.65	1 9.28	16 2 31.97
23	15 52 45.46	10.541	20 13 59.3	31.82	13 40.82	0.683	16 13.84	1 9.39	16 6 28.53
24	15 56 58.85	10.574	20 26 31.7	30.88	13 24.04	0.715	16 14.03	1 9.50	16 10 25.08
25	16 1 13.00	10.606	20 38 41.5	29.92	13 6.49	0.747	16 14.22	1 9.60	16 14 21.64
26	16 5 27.91	10.636	−20 50 28.2	−28.96	−12 48.18	+0.778	16 14.40	1 9.71	16 18 18.19
27	16 9 43.56	10.666	21 1 51.5	27.98	12 29.14	0.808	16 14.58	1 9.81	16 22 14.75
28	16 13 59.92	10.696	21 12 51.1	26.99	12 9.39	0.837	16 14.75	1 9.91	16 26 11.31
29	16 18 16.98	10.725	21 23 26.7	25.97	11 48.95	0.866	16 14.93	1 10.01	16 30 7.86
30	16 22 34.72	10.753	21 33 37.8	24.95	11 27.82	0.894	16 15.10	1 10.10	16 34 4.42
1	16 26 53.12	10.780	−21 43 24.4	−23.92	−11 6.04	+0.921	16 15.26	1 10.19	16 38 0.98
2	16 31 12.15	10.806	21 52 46.1	22.88	10 43.62	0.947	16 15.42	1 10.28	16 41 57.54
3	16 35 31.80	10.831	22 1 42.5	21.82	10 20.59	0.972	16 15.58	1 10.37	16 45 54.09
4	16 39 52.05	10.855	22 10 13.4	20.75	9 56.96	0.996	16 15.73	1 10.45	16 49 50.65
5	16 44 12.87	10.879	22 18 18.6	19.68	9 32.76	1.020	16 15.87	1 10.53	16 53 47.21
6	16 48 34.25	10.902	−22 25 57.8	−18.59	− 9 8.01	+1.043	16 16.01	1 10.60	16 57 43.76
7	16 52 56.16	10.924	22 33 10.8	17.49	8 42.72	1.064	16 16.15	1 10.67	17 1 40.32
8	16 57 18.60	10.945	22 39 57.3	16.38	8 16.92	1.085	16 16.28	1 10.74	17 5 36.88
9	17 1 41.52	10.965	22 46 17.2	15.27	7 50.62	1.105	16 16.39	1 10.80	17 9 33.43
10	17 6 4.92	10.984	22 52 10.0	14.14	7 23.85	1.125	16 16.50	1 10.86	17 13 29.99
11	17 10 28.78	11.003	−22 57 35.9	−13.01	− 6 56.64	+1.143	16 16.61	1 10.92	17 17 26.55
12	17 14 53.06	11.020	23 2 34.6	11.87	6 29.00	1.160	16 16.72	1 10.97	17 21 23.11
13	17 19 17.70	11.035	23 7 5.8	10.72	6 0.98	1.175	16 16.82	1 11.02	17 25 19.66
14	17 23 42.72	11.049	23 11 9.4	9.57	5 32.60	1.189	16 16.91	1 11.06	17 29 16.22
15	17 28 8.07	11.062	23 14 45.3	8.41	5 3.89	1.203	16 17.00	1 11.10	17 33 12.78
16	17 32 33.71	11.073	−23 17 53.4	− 7.25	− 4 34.88	+1.214	16 17.09	1 11.14	17 37 9.34
17	17 36 59.60	11.084	23 20 33.5	6.09	4 5.62	1.224	16 17.17	1 11.17	17 41 5.90
18	17 41 25.73	11.093	23 22 45.6	4.92	3 36.13	1.233	16 17.24	1 11.19	17 45 2.45
19	17 45 52.03	11.099	23 24 29.4	3.74	3 6.47	1.239	16 17.31	1 11.21	17 48 59.01
20	17 50 18.50	11.105	23 25 45.2	2.57	2 36.65	1.245	16 17.38	1 11.23	17 52 55.57
21	17 54 45.07	11.109	−23 26 32.7	− 1.39	− 2 6.71	+1.249	16 17.44	1 11.24	17 56 52.13
22	17 59 11.72	11.111	23 26 51.8	− 0.21	1 36.70	1.251	16 17.50	1 11.25	18 0 48.68
23	18 3 38.40	11.112	23 26 42.6	+ 0.97	1 6.66	1.252	16 17.56	1 11.25	18 4 45.24
24	18 8 5.08	11.111	23 26 5.2	2.15	0 36.62	1.251	16 17.62	1 11.25	18 8 41.80
25	18 12 31.73	11.108	23 24 59.6	3.32	− 0 6.61	1.248	16 17.67	1 11.24	18 12 38.36
26	18 16 58.29	11.104	−23 23 25.6	+ 4.50	+ 0 23.31	+1.244	16 17.71	1 11.23	18 16 34.92
27	18 21 24.75	11.100	23 21 23.5	5.67	0 53.13	1.240	16 17.75	1 11.22	18 20 31.47
28	18 25 51.05	11.092	23 18 53.1	6.85	1 22.80	1.232	16 17.79	1 11.20	18 24 28.03
29	18 30 17.16	11.083	23 15 54.8	8.01	1 52.26	1.223	16 17.83	1 11.17	18 28 24.59
30	18 34 43.05	11.074	23 12 28.5	9.18	2 21.51	1.214	16 17.85	1 11.14	18 32 21.15
31	18 39 8.68	11.062	−23 8 34.2	+10.34	+ 2 50.51	+1.202	16 17.87	1 11.11	18 36 17.70

Note.—For mean time interval of semidiameter passing meridian, subtract 0s.19 from the sidereal interval.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Jan. 13, U Defective Illumination of *N.* 0″.65.
Jan. 14, U Defective Illumination of *N.* 0″.23.
Jan. 15, U Defective Illumination of *N.* 0″.05.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON

Feb. 10, U Defective Illumination of N. 0".01.
Feb. 11, U Defective Illumination of S. 0".21.
Feb. 12, U Defective Illumination of S. 0".04.
Feb. 13, U Defective Illumination of N. 0".[illegible].
Feb. 14, U Defective Illumination of [illegible] 0".01.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Mar. 9, U Defective illumination of N. 8" 38.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Mar. 14, *U Defective illumination of S.* 0″.11. Mar. 23, U Defective illumination of N. 0″ [illegible].

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Date.	Culmination.	Wash. Mean Time.	Var. per Hour of Long.	Right Ascension of Center.	Var. per Hour of Long.	Geocentric Declination of Center.	Var. per Hour of Long.	S. T. of Semid. Passing Meridian.	Geocentric Semidiameter.	Equatorial Horizontal Parallax.	Bright Limbs.
		h m	m	h m s	s	° ′ ″	″	s	′ ″	′ ″	
Apr. 2	U	1 42.79	2.472	2 23 2.17	158.60	+16 36 45.6	+579.5	72.54	16 38.6	60 59.0	I. S.
2	L	14 12.68	2.506	2 54 58.80	160.74	18 22 55.3	480.1	73.07	16 35.6	60 48.2	
3	U	2 42.92	2.531	3 27 16.68	162.10	19 48 8.2	370.5	73.43	16 31.6	60 33.3	I. S.
3	L	15 13.35	2.538	3 59 45.43	162.52	20 50 42.8	254.4	73.56	16 26.6	60 14.9	
4	U	3 43.75	2.527	4 32 12.80	161.87	+21 29 42.7	+135.5	73.43	16 20.8	59 53.7	I. S.
4	L	16 13.91	2.496	5 4 25.83	160.14	21 44 59.1	+ 17.7	73.05	16 14.4	59 30.4	
5	U	4 43.63	2.453	5 36 12.05	157.41	21 37 7.8	− 95.3	72.43	16 7.7	59 5.7	I. S.
5	L	17 12.72	2.394	6 7 20.60	153.89	21 7 22.4	200.8	71.60	16 0.8	58 40.2	
6	U	5 41.05	2.326	6 37 43.14	149.79	+20 17 25.8	−296.8	70.61	15 53.8	58 14.6	I. N.
6	L	18 8.52	2.252	7 7 14.23	145.35	19 9 20.2	382.2	69.52	15 46.9	57 49.3	
7	U	6 35.09	2.177	7 35 51.31	140.82	17 45 17.8	456.3	68.39	15 40.2	57 24.8	I. N.
7	L	19 0.77	2.103	8 3 34.50	136.40	16 7 32.7	519.3	67.26	15 33.8	57 1.2	
8	U	7 25.59	2.034	8 30 26.08	132.25	+14 18 16.0	−571.7	66.17	15 27.7	56 38.9	I. N.
8	L	19 49.62	1.971	8 56 29.91	128.47	12 19 32.3	613.9	65.16	15 22.0	56 18.0	
9	U	8 12.93	1.916	9 21 51.08	125.15	10 13 18.0	646.9	64.26	15 16.7	55 58.6	I. N.
9	L	20 35.64	1.869	9 46 35.40	122.33	8 1 20.1	671.3	63.48	15 11.9	55 40.8	
10	U	8 57.84	1.831	10 10 49.06	120.04	+ 5 45 18.4	−687.7	62.83	15 7.4	55 24.5	I. N.
10	L	21 19.63	1.802	10 34 38.43	118.28	3 26 45.2	696.6	62.32	15 3.4	55 9.8	
11	U	9 41.12	1.781	10 58 9.84	117.04	+ 1 7 7.0	698.6	61.95	14 59.8	54 56.5	I. N.
11	L	22 2.42	1.769	11 21 29.42	116.30	− 1 12 13.6	693.8	61.72	14 56.6	54 44.7	
12	U	10 23.62	1.765	11 44 43.08	116.04	− 3 29 57.8	−682.6	61.62	14 53.8	54 34.3	I. N.
12	L	22 44.81	1.768	12 7 56.38	116.23	5 44 48.7	664.9	61.64	14 51.3	54 25.3	
13	U	11 6.08	1.778	12 31 14.49	116.84	7 55 30.9	641.0	61.79	14 49.2	54 17.5	I. N.S.
13	L	23 27.51	1.794	12 54 42.04	117.81	10 0 49.5	610.9	62.04	14 47.4	54 11.1	
14	U	11 49.16	1.816	13 18 23.15	119.10	−11 59 30.5	−574.8	62.38	14 46.0	54 6.0	I. *II.* S.
15	L	0 11.10	1.841	13 42 21.29	120.64	13 50 20.3	532.5	62.80	14 45.0	54 2.2	
15	U	12 33.37	1.870	14 6 39.14	122.37	15 32 6.3	484.2	63.27	14 44.4	53 59.8	II. S.
16	L	0 55.99	1.901	14 31 18.59	124.22	17 3 37.6	430.1	63.78	14 44.1	53 58.8	
16	U	13 18.99	1.932	14 56 20.55	126.11	−18 23 45.7	−370.4	64.30	14 44.2	53 59.3	II. S.
17	L	1 42.36	1.963	15 21 44.97	127.95	19 31 26.2	305.5	64.81	14 44.8	54 1.3	
17	U	14 6.09	1.991	15 47 30.79	129.66	20 25 39.9	236.1	65.28	14 45.8	54 4.9	II. S.
18	L	2 30.14	2.016	16 13 36.00	131.17	21 5 35.0	162.6	65.71	14 47.3	54 10.4	
18	U	14 54.46	2.037	16 39 57.78	132.41	−21 30 27.6	− 85.8	66.07	14 49.3	54 17.8	II. S.
19	L	3 19.01	2.053	17 6 32.66	133.35	21 39 44.4	− 6.8	66.34	14 51.8	54 27.1	
19	U	15 43.70	2.063	17 33 16.80	133.96	21 33 2.7	+ 73.8	66.53	14 54.9	54 38.5	II. *N.*S.
20	L	4 8.49	2.068	18 0 6.34	134.24	21 10 11.6	154.7	66.64	14 58.6	54 52.1	
20	U	16 33.31	2.068	18 26 57.65	134.26	−20 31 11.8	+235.1	66.67	15 2.9	55 7.9	II. N.
21	L	4 58.10	2.064	18 53 47.71	134.05	19 36 16.0	313.9	66.64	15 7.8	55 26.0	
21	U	17 22.84	2.058	19 20 34.33	133.70	18 25 47.4	390.4	66.56	15 13.3	55 46.2	II. N.
22	L	5 47.50	2.052	19 47 16.39	133.31	17 0 19.6	463.6	66.47	15 19.4	56 8.6	
22	U	18 12.09	2.046	20 13 53.85	132.96	−15 20 35.9	+532.8	66.38	15 26.1	56 33.0	II. N.
23	L	6 36.62	2.043	20 40 27.92	132.76	13 27 29.9	597.3	66.33	15 33.2	56 59.1	
23	U	19 1.13	2.044	21 7 0.98	132.80	11 22 4.3	656.0	66.33	15 40.7	57 26.7	II. N.
24	L	7 25.68	2.050	21 33 36.53	133.19	9 5 32.0	708.2	66.41	15 48.6	57 55.4	
24	U	19 50.35	2.063	22 0 19.04	133.98	− 6 39 18.3	+752.7	66.59	15 56.6	58 24.7	II. N.

Apr. 13, U Defective Illumination of *S.* 0″.02.
Apr. 14, U Defective Illumination of *II.* 0″.06.
Apr. 19, U Defective Illumination of *N.* 0″.29.

'OR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

May 13, U Defective Illumination of *S*. 0".60.
May 14, U Defective Illumination of *I*. 0".02.
May 14, U Defective Illumination of *N*. 0".41.
May 15, U Defective Illumination of N. 0".73.
May 16, U Defective Illumination of N. 0".32.
May 17, U Defective Illumination of S. 0".43.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

May 17, U Defective Illumination of S. 0' .05.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

June 11, U Defective Illumination of S. 0''.63.
June 12, U Defective Illumination of S. 0''.05.

June 13, U Defective Illumination of S. 0''.15.

FOR TRANSIT OF MOON'S CENTER [illegible] OF WASHINGTON.

July 10, U Defective Illumination of *S*. 0″.44.
July 11, U Defective Illumination of *S*. 0″.19.

July 12, U Defective Illumination of [illegible]
July 13, U Defective Illumination of [illegible]

OR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Aug. 7, U Defective Illumination of *S.* 0''.07.
Aug. 8, U Defective Illumination of *N.* 0''.06.

Aug. 9, U Defective Illumination of N. 0''.01.
Aug. 10, U Defective Illumination of S. 0''.02.

FOR TRANSIT OF MOON'S CENTER OVER THE OF WASHINGTON.

Sept. 2, U Defective Illumination of *S.* 0″.56.
Sept. 4, U Defective Illumination of *N.* 0″.51.

Sept. 3, U Defective Illumination of *N.* 0″.[illegible]

R TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Sept. 6, U Defective Illumination of N. 0''.02.

Sept. 9, U Defective Illumination of [illegible]

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Oct. 8, U Defective Illumination of S. 0''.04.

Oct. 13, U Defective Illumination of S. 0''.[illegible]

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

Nov. 6, U *Defective Illumination of N. 0″.76.*
Nov. 7, U Defective Illumination of S. 0″.12.
Nov. 8, U Defective Illumination of S. 0″.[illegible].
Nov. 9, U Defective Illumination of S. 0″.[illegible].

FOR TRANSIT OF MOON'S CENTER OVER THE OF WASHINGTON.

Dec. 6, U Defective Illumination of N. 0″.31. Dec. 7, U Defective Illumination of W. 0″.33.

FOR TRANSIT OF MOON'S CENTER OVER THE MERIDIAN OF WASHINGTON.

FOR TRANSIT AT WASHINGTON.

FOR TRANSIT AT WASHINGTON.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s		h m	h m s	° ′ ″	″	″	s
July 1	1 33	8 8 9.64	+21 54 45.3	7.9	3.0	0.21	Aug. 15	23 51	9 26 38.70	+10 21 50.4	14.2	5.4	0.37
2	1 36	8 14 55.82	21 29 0.4	8.0	3.0	0.22	16	23 44	9 23 50.69	10 45 57.8	14.0	5.3	0.36
3	1 39	8 21 29.84	21 2 16.1	8.1	3.1	0.22	17	23 37	9 21 15.40	11 10 36.5	13.8	5.3	0.36
4	1 41	8 27 51.72	20 34 39.2	8.2	3.1	0.22	18	23 31	9 18 56.30	11 35 23.0	13.6	5.2	0.35
5	1 43	8 34 1.52	20 6 15.9	8.4	3.2	0.22	19	23 25	9 16 56.59	11 59 53.9	13.3	5.1	0.35
6	1 45	8 39 59.32	+19 37 12.3	8.5	3.2	0.23	20	23 20	9 15 19.22	+12 23 47.0	13.1	5.0	0.34
7	1 47	8 45 45.13	19 7 34.4	8.6	3.3	0.23	21	23 14	9 14 6.75	12 46 40.3	12.8	4.8	0.33
8	1 49	8 51 18.99	18 37 28.3	8.7	3.3	0.23	22	23 10	9 13 21.40	13 8 13.1	12.4	4.7	0.32
9	1 50	8 56 40.92	18 6 59.4	8.9	3.4	0.24	23	23 6	9 13 4.95	13 28 6.6	12.1	4.6	0.32
10	1 51	9 1 50.92	17 36 13.3	9.0	3.4	0.24	24	23 2	9 13 18.73	13 46 3.3	11.8	4.5	0.31
11	1 52	9 6 48.94	+17 5 15.7	9.2	3.5	0.24	25	22 59	9 14 3.69	+14 1 47.3	11.5	4.3	0.30
12	1 53	9 11 34.97	16 34 11.9	9.3	3.5	0.25	26	22 56	9 15 20.33	14 15 4.5	11.1	4.2	0.29
13	1 54	9 16 8.91	16 3 7.2	9.5	3.6	0.25	27	22 54	9 17 8.79	14 25 41.9	10.8	4.1	0.28
14	1 54	9 20 30.69	15 32 7.1	9.6	3.7	0.25	28	22 52	9 19 28.80	14 33 28.5	10.5	4.0	0.27
15	1 54	9 24 40.15	15 1 17.1	9.8	3.7	0.26	29	22 51	9 22 19.74	14 38 14.8	10.2	3.9	0.27
16	1 54	9 28 37.16	+14 30 42.4	10.0	3.8	0.26	30	22 51	9 25 40.68	+14 39 52.6	9.9	3.7	0.26
17	1 54	9 32 21.51	14 0 28.9	10.2	3.9	0.26	31	22 50	9 29 30.36	14 38 15.9	9.6	3.6	0.25
18	1 54	9 35 52.96	13 30 41.9	10.3	3.9	0.27	Sept. 1	22 51	9 33 47.23	14 33 20.3	9.3	3.5	0.24
19	1 53	9 39 11.27	13 1 27.6	10.5	4.0	0.27	2	22 52	9 38 29.54	14 25 3.3	9.0	3.4	0.24
20	1 52	9 42 16.15	12 32 51.6	10.7	4.1	0.28	3	22 53	9 43 35.27	14 13 24.5	8.8	3.3	0.23
21	1 51	9 45 7.25	+12 5 0.2	10.9	4.1	0.28	4	22 54	9 49 2.30	+13 58 25.4	8.5	3.2	0.22
22	1 50	9 47 44.21	11 37 59.7	11.1	4.2	0.29	5	22 56	9 54 48.34	13 40 9.9	8.3	3.2	0.22
23	1 48	9 50 6.64	11 11 56.9	11.3	4.3	0.29	6	22 58	10 0 51.10	13 18 43.8	8.1	3.1	0.21
24	1 46	9 52 14.10	10 46 58.5	11.5	4.4	0.30	7	23 0	10 7 8.19	12 54 14.8	7.9	3.0	0.21
25	1 44	9 54 6.14	10 23 11.7	11.7	4.5	0.30	8	23 3	10 13 37.32	12 26 52.2	7.7	2.9	0.20
26	1 42	9 55 42.30	+10 0 43.8	11.9	4.5	0.31	9	23 6	10 20 16.27	+11 56 46.8	7.6	2.9	0.20
27	1 39	9 57 2.08	9 39 42.6	12.1	4.6	0.31	10	23 9	10 27 2.96	11 24 10.8	7.4	2.8	0.19
28	1 37	9 58 5.01	9 20 15.8	12.4	4.7	0.32	11	23 11	10 33 55.45	10 49 16.7	7.3	2.8	0.19
29	1 33	9 58 50.60	9 2 31.7	12.6	4.8	0.32	12	23 14	10 40 52.00	10 12 17.7	7.2	2.7	0.18
30	1 30	9 59 18.42	8 46 38.5	12.8	4.9	0.33	13	23 17	10 47 51.07	9 33 27.0	7.1	2.7	0.18
31	1 26	9 59 28.09	+ 8 32 44.6	13.0	4.9	0.33	14	23 21	10 54 51.31	+ 8 52 57.6	7.0	2.6	0.18
Aug. 1	1 22	9 59 19.28	8 20 57.7	13.2	5.0	0.34	15	23 24	11 1 51.59	8 11 2.1	6.9	2.6	0.17
2	1 18	9 58 51.80	8 11 26.2	13.4	5.1	0.34	16	23 27	11 8 50.94	7 27 52.6	6.8	2.6	0.17
3	1 13	9 58 5.57	8 4 17.2	13.6	5.2	0.35	17	23 30	11 15 48.61	6 43 40.5	6.7	2.5	0.17
4	1 8	9 57 0.67	7 59 37.7	13.8	5.2	0.35	18	23 33	11 22 43.97	5 58 36.3	6.6	2.5	0.17
5	1 3	9 55 37.42	+ 7 57 33.4	14.0	5.3	0.36	19	23 36	11 29 36.56	+ 5 12 49.8	6.6	2.5	0.17
6	0 57	9 53 56.37	7 58 9.0	14.1	5.4	0.36	20	23 38	11 36 26.01	4 26 29.7	6.5	2.5	0.17
7	0 51	9 51 58.34	8 1 27.6	14.3	5.4	0.36	21	23 41	11 43 12.09	3 39 44.4	6.5	2.5	0.16
8	0 45	9 49 44.48	8 7 29.9	14.4	5.4	0.37	22	23 44	11 49 54.63	2 52 41.0	6.4	2.4	0.16
9	0 39	9 47 16.32	8 16 14.7	14.5	5.5	0.37	23	23 47	11 56 33.57	2 5 26.0	6.4	2.4	0.16
10	0 32	9 44 35.69	+ 8 27 38.2	14.5	5.5	0.37	24	23 49	12 3 8.89	+ 1 18 5.5	6.4	2.4	0.16
11	0 25	9 41 44.83	8 41 33.6	14.6	5.5	0.37	25	23 52	12 9 40.61	+ 0 30 44.6	6.3	2.4	0.16
12	0 18	9 38 46.37	8 57 51.2	14.6	5.5	0.37	26	23 54	12 16 8.81	− 0 16 31.9	6.3	2.4	0.16
13	0 11	9 35 43.20	9 16 18.4	14.5	5.5	0.37	27	23 57	12 22 33.59	1 3 39.7	6.3	2.4	0.16
14	0 4	9 32 38.55	9 36 39.7	14.5	5.5	0.37	28	23 59	12 28 55.07	1 50 35.1	6.3	2.4	0.16
14	*23 57*	*9 29 35.87*	+ 9 58 37.0	14.4	5.4	0.37	30	0 2	12 35 13.41	− 2 37 14.7	6.2	2.4	0.16
15	*23 51*	*9 26 38.70*	+10 21 50.4	14.2	5.4	0.37	Oct. 1	0 4	12 41 28.75	− 3 23 35.5	6.2	2.4	0.16

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s
Oct. 1	0 4	12 41 28.75	− 3 23 35.5	6.2	2.4	0.16
2	0 6	12 47 41.29	4 9 34.7	6.2	2.4	0.16
3	0 8	12 53 51.16	4 55 9.9	6.2	2.4	0.16
4	0 11	12 59 58.57	5 40 18.9	6.2	2.4	0.16
5	0 13	13 6 3.67	6 24 59.5	6.2	2.4	0.16
6	0 15	13 12 6.66	− 7 9 9.9	6.2	2.4	0.16
7	0 17	13 18 7.70	7 52 48.3	6.2	2.4	0.16
8	0 19	13 24 6.96	8 35 53.4	6.2	2.4	0.16
9	0 21	13 30 4.60	9 18 23.3	6.3	2.4	0.16
10	0 23	13 36 0.78	10 0 16.8	6.3	2.4	0.16
11	0 25	13 41 55.65	−10 41 32.5	6.3	2.4	0.16
12	0 27	13 47 49.35	11 22 9.0	6.3	2.4	0.16
13	0 29	13 53 42.03	12 2 5.3	6.3	2.4	0.16
14	0 31	13 59 33.80	12 41 20.0	6.3	2.4	0.17
15	0 33	14 5 24.75	13 19 51.7	6.4	2.4	0.17
16	0 34	14 11 15.01	−13 57 39.4	6.4	2.4	0.17
17	0 36	14 17 4.65	14 34 42.0	6.4	2.4	0.17
18	0 38	14 22 53.74	15 10 57.9	6.5	2.5	0.17
19	0 40	14 28 42.34	15 46 26.2	6.5	2.5	0.17
20	0 42	14 34 30.50	16 21 5.5	6.5	2.5	0.17
21	0 44	14 40 18.23	−16 54 54.5	6.6	2.5	0.17
22	0 46	14 46 5.54	17 27 52.1	6.6	2.5	0.18
23	0 47	14 51 52.40	17 59 56.5	6.7	2.5	0.18
24	0 49	14 57 38.80	18 31 6.8	6.7	2.5	0.18
25	0 51	15 3 24.66	19 1 21.3	6.8	2.6	0.18
26	0 53	15 9 9.88	−19 30 38.6	6.8	2.6	0.18
27	0 55	15 14 54.35	19 58 57.2	6.9	2.6	0.19
28	0 57	15 20 37.93	20 26 15.5	6.9	2.6	0.19
29	0 58	15 26 20.41	20 52 31.8	7.0	2.7	0.19
30	1 0	15 32 1.58	21 17 44.6	7.1	2.7	0.19
31	1 2	15 37 41.13	−21 41 52.0	7.2	2.7	0.20
Nov. 1	1 3	15 43 18.75	22 4 52.3	7.3	2.8	0.20
2	1 5	15 48 54.08	22 26 43.5	7.3	2.8	0.20
3	1 7	15 54 26.63	22 47 23.9	7.4	2.8	0.20
4	1 8	15 59 55.91	23 6 51.2	7.5	2.9	0.21
5	1 10	16 5 21.30	−23 25 3.6	7.6	2.9	0.21
6	1 11	16 10 42.12	23 41 58.8	7.8	3.0	0.22
7	1 12	16 15 57.58	23 57 34.6	7.9	3.0	0.22
8	1 14	16 21 6.78	24 11 48.8	8.0	3.0	0.22
9	1 15	16 26 8.69	24 24 39.0	8.1	3.1	0.23
10	1 16	16 31 2.11	−24 36 2.8	8.3	3.2	0.23
11	1 16	16 35 45.74	24 45 57.4	8.5	3.2	0.24
12	1 17	16 40 18.06	24 54 20.2	8.6	3.3	0.24
13	1 17	16 44 37.35	25 1 8.5	8.8	3.3	0.25
14	1 17	16 48 41.73	25 6 19.0	9.0	3.4	0.25
15	1 17	16 52 29.05	−25 9 48.8	9.2	3.5	0.26
16	1 17	*16 55 56.91*	*−25 11 34.2*	*9.4*	*3.6*	*0.26*

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s
Nov. 16	1 17	16 55 56.91	−25 11 34.2	9.4	3.6	0.26
17	1 16	16 59 2.73	25 11 31.5	9.6	3.7	0.27
18	1 15	17 1 43.65	25 9 36.4	9.9	3.7	0.28
19	1 13	17 3 56.61	25 5 44.6	10.1	3.8	0.28
20	1 11	17 5 38.41	24 59 50.8	10.4	3.9	0.29
21	1 8	17 6 45.77	−24 51 49.8	10.6	4.0	0.30
22	1 5	17 7 15.46	24 41 35.5	10.9	4.1	0.30
23	1 0	17 7 4.46	24 29 1.9	11.2	4.3	0.31
24	0 56	17 6 10.21	24 14 3.3	11.5	4.4	0.32
25	0 50	17 4 30.93	23 56 34.8	11.8	4.5	0.33
26	0 44	17 2 5.94	−23 36 33.6	12.0	4.6	0.33
27	0 37	16 58 56.04	23 14 0.2	12.3	4.7	0.34
28	0 29	16 55 3.85	22 49 0.7	12.5	4.7	0.34
29	0 20	16 50 34.03	22 21 48.1	12.7	4.8	0.35
30	0 11	16 45 33.40	21 52 44.5	12.8	4.9	0.35
Dec. 1	0 2	16 40 10.72	−21 22 21.7	12.9	4.9	0.35
1	23 53	16 34 36.27	20 51 20.9	13.0	4.9	0.35
2	23 43	16 29 1.17	20 20 30.8	12.9	4.9	0.35
3	23 34	16 23 36.57	19 50 43.9	12.9	4.9	0.35
4	23 25	16 18 32.78	19 22 52.2	12.7	4.8	0.34
5	23 16	16 13 58.66	−18 57 42.7	12.5	4.8	0.34
6	23 8	16 10 1.09	18 35 53.7	12.3	4.7	0.33
7	23 1	16 6 44.85	18 17 52.1	12.0	4.6	0.32
8	22 55	16 4 12.66	18 3 53.4	11.7	4.5	0.31
9	22 49	16 2 25.42	17 54 1.6	11.4	4.4	0.30
10	22 44	16 1 22.55	−17 48 11.4	11.2	4.2	0.30
11	22 40	16 1 2.40	17 46 10.2	10.9	4.1	0.29
12	22 36	16 1 22.54	17 47 39.9	10.6	4.0	0.28
13	22 33	16 2 20.15	17 52 19.7	10.3	3.9	0.27
14	22 31	16 3 52.14	17 59 47.0	10.0	3.8	0.27
15	22 29	16 5 55.45	−18 9 38.8	9.8	3.7	0.26
16	22 28	16 8 27.06	18 21 32.9	9.5	3.6	0.25
17	22 27	16 11 24.15	18 35 8.3	9.3	3.5	0.25
18	22 26	16 14 44.12	18 50 5.4	9.1	3.4	0.24
19	22 26	16 18 24.57	19 6 6.3	8.9	3.4	0.24
20	22 26	16 22 23.36	−19 22 55.0	8.7	3.3	0.23
21	22 26	16 26 38.57	19 40 16.9	8.5	3.2	0.23
22	22 27	16 31 8.49	19 57 59.1	8.3	3.2	0.22
23	22 27	16 35 51.63	20 15 50.3	8.2	3.1	0.22
24	22 28	16 40 46.63	20 33 40.1	8.0	3.1	0.22
25	22 30	16 45 52.34	−20 51 19.7	7.9	3.0	0.21
26	22 31	16 51 7.74	21 8 41.2	7.8	2.9	0.21
27	22 32	16 56 31.91	21 25 37.4	7.7	2.9	0.21
28	22 34	17 2 4.03	21 42 2.3	7.5	2.9	0.21
29	22 36	17 7 43.43	21 57 50.3	7.4	2.8	0.20
30	22 37	17 13 29.47	−22 12 56.5	7.3	2.8	0.2
31	22 39	17 19 21.61	−22 27 16.8	7.2	2.7	0.

FOR TRANSIT AT WASHINGTON.

FOR TRANSIT AT WASHINGTON.

FOR TRANSIT AT WASHINGTON.

FOR TRANSIT AT WASHINGTON.

JUPITER, 1919.

FOR TRANSIT AT WASHINGTON.

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Ja.

Fe

Stellar magnitude at opposition in January, 1919, −2.2.

FOR TRANSIT AT WASHINGTON.

Stellar magnitude at opposition in January, 1919, −2.3.

FOR TRANSIT AT WASHINGTON.

Stellar magnitude at opposition in February, [illegible]

FOR TRANSIT AT WASHINGTON.

Stellar magnitude at opposition in February, 1919, +0.2.

URANUS, 1919.

FOR TRANSIT AT WASHINGTON.

Stellar magnitude at opposition in August, 1919, 6.1.

FOR TRANSIT AT WASHINGTON.

Stellar magnitude at opposition in August, 1919, 6.1.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s
Jan. 0	14 5	8 44 19.64	+18 0 7.5	0.3	1.3	0.09
1	14 1	8 44 13.83	18 0 30.6	0.3	1.3	0.09
2	13 57	8 44 7.95	18 0 53.9	0.3	1.3	0.09
3	13 53	8 44 2.00	18 1 17.6	0.3	1.3	0.09
4	13 49	8 43 55.98	18 1 41.4	0.3	1.3	0.09
5	13 45	8 43 49.89	+18 2 5.5	0.3	1.3	0.09
6	13 41	8 43 43.74	18 2 29.8	0.3	1.3	0.09
7	13 37	8 43 37.53	18 2 54.4	0.3	1.3	0.09
8	13 32	8 43 31.26	18 3 19.1	0.3	1.3	0.09
9	13 28	8 43 24.94	18 3 44.1	0.3	1.3	0.09
10	13 24	8 43 18.57	+18 4 9.2	0.3	1.3	0.09
11	13 20	8 43 12.15	18 4 34.5	0.3	1.3	0.09
12	13 16	8 43 5.68	18 5 0.0	0.3	1.3	0.09
13	13 12	8 42 59.18	18 5 25.6	0.3	1.3	0.09
14	13 8	8 42 52.64	18 5 51.3	0.3	1.3	0.09
15	13 4	8 42 46.05	+18 6 17.3	0.3	1.3	0.09
16	13 0	8 42 39.43	18 6 43.3	0.3	1.3	0.09
17	12 56	8 42 32.77	18 7 9.3	0.3	1.3	0.09
18	12 52	8 42 26.08	18 7 35.6	0.3	1.3	0.09
19	12 48	8 42 19.36	18 8 2.0	0.3	1.3	0.09
20	12 44	8 42 12.62	+18 8 28.4	0.3	1.3	0.09
21	12 40	8 42 5.86	18 8 54.9	0.3	1.3	0.09
22	12 36	8 41 59.07	18 9 21.4	0.3	1.3	0.09
23	12 32	8 41 52.26	18 9 48.1	0.3	1.3	0.09
24	12 28	8 41 45.45	18 10 14.8	0.3	1.3	0.09
25	12 24	8 41 38.63	+18 10 41.5	0.3	1.3	0.09
26	12 20	8 41 31.78	18 11 8.2	0.3	1.3	0.09
27	12 16	8 41 24.93	18 11 34.9	0.3	1.3	0.09
28	12 12	8 41 18.08	18 12 1.6	0.3	1.3	0.09
29	12 8	8 41 11.23	18 12 28.4	0.3	1.3	0.09
30	12 4	8 41 4.38	+18 12 55.1	0.3	1.3	0.09
31	12 0	8 40 57.55	18 13 21.8	0.3	1.3	0.09
Feb. 1	11 55	8 40 50.72	18 13 48.5	0.3	1.3	0.09
2	11 51	8 40 43.90	18 14 15.1	0.3	1.3	0.09
3	11 47	8 40 37.09	18 14 41.6	0.3	1.3	0.09
4	11 43	8 40 30.30	+18 15 8.0	0.3	1.3	0.09
5	11 39	8 40 23.52	18 15 34.3	0.3	1.3	0.09
6	11 35	8 40 16.77	18 16 0.5	0.3	1.3	0.09
7	11 31	8 40 10.05	18 16 26.7	0.3	1.3	0.09
8	11 27	8 40 3.36	18 16 52.7	0.3	1.3	0.09
9	11 23	8 39 56.69	+18 17 18.5	0.3	1.3	0.09
10	11 19	8 39 50.06	18 17 44.2	0.3	1.3	0.09
11	11 15	8 39 43.47	18 18 9.8	0.3	1.3	0.09
12	11 11	8 39 36.91	18 18 35.2	0.3	1.3	0.09
13	11 7	8 39 30.39	18 19 0.5	0.3	1.3	0.09
14	*11 3*	8 39 23.92	+18 19 25.5	0.3	1.3	0.09
15	*10 59*	8 39 17.50	+18 19 50.4	0.3	1.3	0.09
Feb. 15	10 59	8 39 17.50	+18 19 50.4	0.3	1.3	0.09
16	10 55	8 39 11.12	18 20 15.2	0.3	1.3	0.09
17	10 51	8 39 4.80	18 20 39.7	0.3	1.3	0.09
18	10 47	8 38 58.52	18 21 4.0	0.3	1.3	0.09
19	10 43	8 38 52.30	18 21 28.0	0.3	1.3	0.09
20	10 39	8 38 46.15	+18 21 51.9	0.3	1.3	0.09
21	10 35	8 38 40.05	18 22 15.5	0.3	1.3	0.09
22	10 31	8 38 34.01	18 22 38.9	0.3	1.3	0.09
23	10 27	8 38 28.04	18 23 2.0	0.3	1.3	0.09
24	10 23	8 38 22.13	18 23 24.9	0.3	1.3	0.09
25	10 19	8 38 16.30	+18 23 47.4	0.3	1.3	0.09
26	10 15	8 38 10.54	18 24 9.7	0.3	1.3	0.09
27	10 11	8 38 4.86	18 24 31.7	0.3	1.3	0.09
28	10 6	8 37 59.25	18 24 53.4	0.3	1.3	0.09
Mar. 1	10 2	8 37 53.72	18 25 14.8	0.3	1.3	0.09
2	9 58	8 37 48.28	+18 25 35.9	0.3	1.3	0.09
3	9 54	8 37 42.92	18 25 56.6	0.3	1.3	0.09
4	9 50	8 37 37.64	18 26 17.1	0.3	1.3	0.09
5	9 46	8 37 32.46	18 26 37.2	0.3	1.3	0.09
6	9 42	8 37 27.36	18 26 56.9	0.3	1.3	0.09
7	9 38	8 37 22.36	+18 27 16.2	0.3	1.3	0.09
8	9 34	8 37 17.46	18 27 35.2	0.3	1.3	0.09
9	9 30	8 37 12.65	18 27 53.9	0.3	1.3	0.09
10	9 26	8 37 7.93	18 28 12.2	0.3	1.3	0.09
11	9 22	8 37 3.32	18 28 30.1	0.3	1.3	0.09
12	9 18	8 36 58.81	+18 28 47.7	0.3	1.3	0.09
13	9 14	8 36 54.41	18 29 4.8	0.3	1.3	0.09
14	9 10	8 36 50.10	18 29 21.5	0.3	1.3	0.09
15	9 6	8 36 45.90	18 29 37.9	0.3	1.3	0.09
16	9 2	8 36 41.81	18 29 53.9	0.3	1.3	0.09
17	8 58	8 36 37.83	+18 30 9.4	0.3	1.3	0.09
18	8 54	8 36 33.96	18 30 24.5	0.3	1.3	0.09
19	8 50	8 36 30.21	18 30 39.2	0.3	1.3	0.09
20	8 46	8 36 26.56	18 30 53.5	0.3	1.3	0.09
21	8 42	8 36 23.02	18 31 7.3	0.3	1.3	0.09
22	8 38	8 36 19.61	+18 31 20.7	0.3	1.3	0.09
23	8 34	8 36 16.31	18 31 33.7	0.3	1.3	0.09
24	8 30	8 36 13.14	18 31 46.3	0.3	1.3	0.09
25	8 26	8 36 10.08	18 31 58.5	0.3	1.3	0.09
26	8 22	8 36 7.14	18 32 10.2	0.3	1.3	0.09
27	8 18	8 36 4.33	+18 32 21.4	0.3	1.3	0.09
28	8 14	8 36 1.64	18 32 32.1	0.3	1.3	0.09
29	8 10	8 35 59.07	18 32 42.4	0.3	1.3	0.09
30	8 6	8 35 56.64	18 32 52.2	0.3	1.3	0.09
31	8 2	8 35 54.33	18 33 1.6	0.3	1.3	0.09
Apr. 1	7 58	8 35 52.14	+18 33 10.5	0.3	1.3	0.09
2	7 55	8 35 50.08	+18 33 18.9	0.3	1.3	0.09

Stellar magnitude at opposition in January, 1919, 7.7.

FOR TRANSIT AT WASHINGTON.

Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.	Date.	Wash. Mean Time.	Apparent Right Ascension.	Apparent Declination.	Hor. Par.	Semidiam.	S. T. of Sem. Pass. Mer.
	h m	h m s	° ′ ″	″	″	s		h m	h m s	° ′ ″	″	″	s
pr. 1	7 58	8 35 52.14	+18 33 10.5	0.3	1.3	0.09	Nov. 15	17 18	8 55 59.03	+17 17 25.2	0.3	1.3	0.09
2	7 55	8 35 50.08	18 33 18.9	0.3	1.3	0.09	16	17 14	8 55 58.76	17 17 26.9	0.3	1.3	0.09
3	7 51	8 35 48.16	18 33 26.7	0.3	1.3	0.09	17	17 10	8 55 58.36	17 17 29.2	0.3	1.3	0.09
4	7 47	8 35 46.37	18 33 34.1	0.3	1.3	0.09	18	17 6	8 55 57.82	17 17 32.0	0.3	1.3	0.09
5	7 43	8 35 44.70	18 33 41.0	0.3	1.3	0.09	19	17 2	8 55 57.14	17 17 35.4	0.3	1.3	0.09
6	7 39	8 35 43.17	+18 33 47.5	0.3	1.3	0.09	20	16 58	8 55 56.33	+17 17 39.4	0.3	1.3	0.09
7	7 35	8 35 41.77	18 33 53.4	0.3	1.3	0.09	21	16 55	8 55 55.38	17 17 43.9	0.3	1.3	0.09
8	7 31	8 35 40.51	18 33 58.9	0.3	1.3	0.09	22	16 51	8 55 54.29	17 17 49.0	0.3	1.3	0.09
9	7 27	8 35 39.37	18 34 3.9	0.3	1.3	0.09	23	16 47	8 55 53.07	17 17 54.6	0.3	1.3	0.09
10	7 23	8 35 38.37	18 34 8.4	0.3	1.3	0.09	24	16 43	8 55 51.72	17 18 0.8	0.3	1.3	0.09
11	7 19	8 35 37.51	+18 34 12.4	0.3	1.3	0.09	25	16 39	8 55 50.23	+17 18 7.6	0.3	1.3	0.09
12	7 15	8 35 36.77	18 34 16.0	0.3	1.3	0.09	26	16 35	8 55 48.61	17 18 14.9	0.3	1.3	0.09
13	7 11	8 35 36.17	18 34 19.0	0.3	1.3	0.09	27	16 31	8 55 46.85	17 18 22.7	0.3	1.3	0.09
14	7 7	8 35 35.70	18 34 21.6	0.3	1.3	0.09	28	16 27	8 55 44.97	17 18 31.1	0.3	1.3	0.09
15	7 3	8 35 35.37	18 34 23.7	0.3	1.3	0.09	29	16 23	8 55 42.95	17 18 40.0	0.3	1.3	0.09
16	6 59	8 35 35.17	+18 34 25.3	0.3	1.3	0.09	30	16 19	8 55 40.80	+17 18 49.5	0.3	1.3	0.09
17	6 55	8 35 35.11	18 34 26.3	0.3	1.3	0.09	Dec. 1	16 15	8 55 38.52	17 18 59.5	0.3	1.3	0.09
18	6 51	8 35 35.19	18 34 26.9	0.3	1.3	0.09	2	16 11	8 55 36.12	17 19 10.0	0.3	1.3	0.09
19	6 47	8 35 35.39	18 34 27.0	0.3	1.3	0.09	3	16 7	8 55 33.59	17 19 21.0	0.3	1.3	0.09
20	6 44	8 35 35.73	18 34 26.6	0.3	1.3	0.09	4	16 3	8 55 30.94	17 19 32.5	0.3	1.3	0.09
21	6 40	8 35 36.20	+18 34 25.7	0.3	1.3	0.09	5	15 59	8 55 28.16	+17 19 44.5	0.3	1.3	0.09
22	6 36	8 35 36.81	18 34 24.2	0.3	1.3	0.09	6	15 55	8 55 25.27	17 19 57.0	0.3	1.3	0.09
23	6 32	8 35 37.56	18 34 22.2	0.3	1.3	0.09	7	15 51	8 55 22.25	17 20 10.0	0.3	1.3	0.09
24	6 28	8 35 38.44	18 34 19.8	0.3	1.3	0.09	8	15 47	8 55 19.11	17 20 23.5	0.3	1.3	0.09
	. . . .	. . . .	. . . .	. .	. .	. . .	9	15 43	8 55 15.85	17 20 37.6	0.3	1.3	0.09
ct. 25	18 40	8 55 33.08	+17 18 59.6	0.3	1.3	0.09	10	15 39	8 55 12.47	+17 20 52.1	0.3	1.3	0.09
26	18 36	8 55 35.67	17 18 49.6	0.3	1.3	0.09	11	15 35	8 55 8.97	17 21 7.1	0.3	1.3	0.09
27	18 33	8 55 38.12	17 18 40.1	0.3	1.3	0.09	12	15 31	8 55 5.35	17 21 22.6	0.3	1.3	0.09
28	18 29	8 55 40.44	17 18 31.1	0.3	1.3	0.09	13	15 27	8 55 1.62	17 21 38.5	0.3	1.3	0.09
29	18 25	8 55 42.62	17 18 22.7	0.3	1.3	0.09	14	15 23	8 54 57.77	17 21 54.9	0.3	1.3	0.09
30	18 21	8 55 44.67	+17 18 14.8	0.3	1.3	0.09	15	15 19	8 54 53.81	+17 22 11.8	0.3	1.3	0.09
31	18 17	8 55 46.59	17 18 7.5	0.3	1.3	0.09	16	15 15	8 54 49.74	17 22 29.1	0.3	1.3	0.09
ov. 1	18 13	8 55 48.37	17 18 0.8	0.3	1.3	0.09	17	15 11	8 54 45.56	17 22 46.9	0.3	1.3	0.09
2	18 9	8 55 50.02	17 17 54.6	0.3	1.3	0.09	18	15 7	8 54 41.27	17 23 5.1	0.3	1.3	0.09
3	18 5	8 55 51.53	17 17 49.0	0.3	1.3	0.09	19	15 3	8 54 36.88	17 23 23.7	0.3	1.3	0.09
4	18 1	8 55 52.90	+17 17 44.0	0.3	1.3	0.09	20	14 59	8 54 32.39	+17 23 42.7	0.3	1.3	0.09
5	17 57	8 55 54.14	17 17 39.5	0.3	1.3	0.09	21	14 55	8 54 27.79	17 24 2.2	0.3	1.3	0.09
6	17 54	8 55 55.24	17 17 35.5	0.3	1.3	0.09	22	14 51	8 54 23.09	17 24 22.1	0.3	1.3	0.09
7	17 50	8 55 56.21	17 17 32.1	0.3	1.3	0.09	23	14 47	8 54 18.29	17 24 42.3	0.3	1.3	0.09
8	17 46	8 55 57.04	17 17 29.3	0.3	1.3	0.09	24	14 43	8 54 13.40	17 25 3.0	0.3	1.3	0.09
9	17 42	8 55 57.74	+17 17 27.0	0.3	1.3	0.09	25	14 39	8 54 8.41	+17 25 24.0	0.3	1.3	0.09
10	17 38	8 55 58.30	17 17 25.3	0.3	1.3	0.09	26	14 35	8 54 3.33	17 25 45.4	0.3	1.3	0.09
11	17 34	8 55 58.72	17 17 24.1	0.3	1.3	0.09	27	14 31	8 53 58.16	17 26 7.1	0.3	1.3	0.09
12	17 30	8 55 59.00	17 17 23.5	0.3	1.3	0.09	28	14 27	8 53 52.90	17 26 29.2	0.3	1.3	0.09
13	17 26	8 55 59.15	17 17 23.5	0.3	1.3	0.09	29	14 23	8 53 47.56	17 26 51.6	0.3	1.3	0.09
14	17 22	8 55 59.16	+17 17 24.1	0.3	1.3	0.09	30	14 19	8 53 42.13	+17 27 14.4	0.3	1.3	0.09
15	17 18	8 55 59.03	+17 17 25.2	0.3	1.3	0.09	31	14 15	8 53 36.62	+17 27 37.3	0.3	1.3	0.0

Stellar magnitude at opposition in January, 1919, 7.7.

PART III.

PHENOMENA.

In the year 1919 there will be three eclipses, two of the Sun and one of the Moon.

I.—*A Total Eclipse of the Sun*, May 28–29, 1919, invisible at Washington.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of ☌ in right ascension, May 29d 1h 6m 38.0s

Sun and Moon's R. A.	4h 21m 6.93s	Hourly motions	10.17s and 161.66s
Sun's declination	+21° 30′ 15.1″	Hourly motion	+ 0′ 23.9″
Moon's declination	+21° 12′ 12.4″	Hourly motion	+ 2′ 49.7″
Sun's equa. hor. parallax	8.7″	Sun's true semidiameter	15′ 46.6″
Moon's equa. hor. parallax	61′ 3.8″	Moon's true semidiameter	16′ 37.5″

CIRCUMSTANCES OF THE ECLIPSE.

	Greenwich Mean Time. d h m	Longitude from Greenwich. ° ′	Latitude. ° ′
Eclipse begins	May 28 22 33.5	+63 27	−14 6
Central eclipse begins	28 23 30.1	+75 9	−19 43
Central eclipse at local apparent noon	29 1 6.6	+17 23	+ 4 18
Central eclipse ends	29 2 47.4	−42 27	−12 25
Eclipse ends	29 3 44.0	−30 36	− 6 46

II.—*A Partial Eclipse of the Moon*, November 7, 1919, visible at Washington; the beginning visible generally in Asia except the eastern portion, Europe, Africa, the eastern part of North America, and South America except the extreme western part; the ending visible generally in western Asia, Europe, Africa, South America, and North America except the extreme western part.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of ☍ in right ascension, Nov. 7d 12h 3m 54.1s

Sun's right ascension	14h 48m 16.89s	Hourly motion	9.99s
Moon's right ascension	2 48 16.89	Hourly motion	155.96
Sun's declination	−16° 12′ 18.1″	Hourly motion	− 0′ 44.5″
Moon's declination	+17 10 9.9	Hourly motion	+ 7 53.9
Sun's equa. hor. parallax	8.9	Sun's true semidiameter	16 8.7
Moon's equa. hor. parallax	61 18.2	Moon's true semidiameter	16 41.4

CIRCUMSTANCES OF THE ECLIPSE.

	d h m	
Moon enters penumbra	Nov. 7 9 33.6	Greenwich Mean Time.
Moon enters umbra	7 10 58.3	
Middle of the eclipse	7 11 44.1	
Moon leaves umbra	7 12 29.9	
Moon leaves penumbra	7 13 55.0	

Contacts of Umbra with Moon's Limb.	Angles of Position from the North Point. °	The Moon being in the Zenith in Longitude from Greenwich, ° ′	and in Latitude ° ′
First	143 to E.	−10 42	+17 1
Last	166 to W.	+11 16	+17 13

Magnitude of the eclipse = 0.184 (Moon's diameter = 1.0).

III.—*An Annular Eclipse of the Sun,* November 22, 1919, visible at ashington as a partial eclipse.

ELEMENTS OF THE ECLIPSE.

Greenwich mean time of ☌ in right ascension, November 22d 3h 7m 37.5s

Sun and Moon's R. A.	15h 48m 14.18s	Hourly motions	10.50s and 124.64s
Sun's declination	−20° 0′ 6.2″	Hourly motion	− 0′ 32.8″
Moon's declination	−19 35 28.1	Hourly motion	− 3 42.9
Sun's equa. hor. parallax	8.9	Sun's true semidiameter	16 11.7
Moon's equa. hor. parallax	53 56.8	Moon's true semidiameter	14 41.3

CIRCUMSTANCES OF THE ECLIPSE.

		Greenwich Mean Time. d h m	Longitude from Greenwich. ° ′	Latitude. ° ′
Eclipse begins	November	22 0 14.4	+ 88 35	+22 11
Central eclipse begins		22 1 28.0	+102 31	+31 41
Central eclipse at local apparent noon		22 3 7.6	+ 50 24	+ 7 18
Central eclipse ends		22 5 0.1	− 4 11	+19 11
Eclipse ends		22 6 13.7	+ 10 25	+ 9 33

The regions within which the eclipses of the Sun are visible are laid down . the accompanying charts, from which, by means of the dotted lines, the eenwich mean times of beginning and ending at any place may be found th an uncertainty which will vary from three or four minutes for a high in to fifteen or twenty minutes when the Sun is near the horizon.

BESSELIAN ELEMENTS OF THE TOTAL ECLIPSE OF THE SUN, MAY 28–29, 1919.

Greenwich Mean Time.	Coordinates of Center of Shadow on Fundamental Plane.		Direction of Axis of Shadow.			Radius of Penumbra and Umbra on Fundamental Plane.	
	x	y	Log sin d	Log cos d	μ	l_1	l_2
h m					° ′		
22 30	−1.51297	−0.40113	+9.56384	+9.96871	338 13.8	+0.53172	−0.01412
40	1.41640	0.39438	9.56386	9.96871	340 43.8	0.53174	0.01411
50	1.31982	0.38763	9.56388	9.96870	343 13.8	0.53176	0.01409
23 0	−1.22325	−0.38089	+9.56390	+9.96870	345 43.8	+0.53177	−0.01407
10	1.12666	0.37416	9.56392	9.96870	348 13.8	0.53179	0.01406
20	1.03008	0.36744	9.56394	9.96869	350 43.8	0.53181	0.01404
30	0.93349	0.36073	9.56396	9.96869	353 13.8	0.53182	0.01403
40	0.83690	0.35402	9.56398	9.96869	355 43.8	0.53184	0.01401
50	0.74030	0.34732	9.56400	9.96868	358 13.8	0.53185	0.01400
0 0	−0.64371	−0.34063	+9.56403	+9.96868	0 43.8	+0.53186	−0.01399
10	0.54711	0.33394	9.56405	9.96868	3 13.8	0.53187	0.01397
20	0.45051	0.32727	9.56407	9.96868	5 43.8	0.53188	0.01396
30	0.35391	0.32060	9.56409	9.96868	8 13.8	0.53189	0.01395
40	0.25730	0.31394	9.56411	9.96867	10 43.8	0.53190	0.01394
50	0.16070	0.30728	9.56413	9.96867	13 13.8	0.53191	0.01393
1 0	−0.06409	−0.30064	+9.56416	+9.96867	15 43.8	+0.53192	−0.01392
10	+0.03251	0.29400	9.56418	9.96867	18 13.8	0.53193	0.01392
20	0.12912	0.28737	9.56420	9.96866	20 43.8	0.53194	0.01391
30	0.22572	0.28075	9.56422	9.96866	23 13.8	0.53194	0.01390
40	0.32233	0.27413	9.56424	9.96866	25 43.8	0.53195	0.01390
50	0.41893	0.26753	9.56426	9.96865	28 13.8	0.53195	0.01389
2 0	+0.51554	−0.26093	+9.56428	+9.96865	30 43.8	+0.53196	−0.01389
10	0.61214	0.25434	9.56430	9.96865	33 13.8	0.53196	0.01389
20	0.70874	0.24775	9.56432	9.96864	35 43.8	0.53196	0.01388
30	0.80533	0.24118	9.56434	9.96864	38 13.8	0.53197	0.01388
40	0.90193	0.23461	9.56437	9.96864	40 43.8	0.53197	0.01388
50	0.99852	0.22805	9.56439	9.96863	43 13.8	0.53197	0.01388
3 0	+1.09511	−0.22150	+9.56441	+9.96863	45 43.8	+0.53197	−0.01388
10	1.19170	0.21496	9.56443	9.96863	48 13.8	0.53197	0.01388
20	1.28828	0.20842	9.56445	9.96862	50 43.8	0.53197	0.01388
30	1.38486	0.20189	9.56447	9.96862	53 13.8	0.53197	0.01388
40	1.48144	0.19537	9.56449	9.96862	55 43.8	0.53196	0.01388
50	+1.57801	−0.18886	+9.56451	+9.96861	58 13.8	+0.53196	−0.01389

Greenwich Mean Time.	Log x' for 1 Minute.	Log y' for 1 Minute.	Log μ' for 1 Minute.	Log Tangents of Angles of Cones.	
				Penumbra.	Umbra.
h m					
22 0	+7.9848	+6.8311	+1.1761	+7.66389	+7.66172
23 0	7.9849	6.8283	1.1761	7.66388	7.66171
0 0	7.9850	6.8253	1.1761	7.66388	7.66171
1 0	7.9850	6.8223	1.1761	7.66388	7.66171
2 0	7.9850	6.8192	1.1761	7.66387	7.66171
3 0	7.9849	6.8161	1.1761	7.66387	7.66170
4 0	+7.9848	+6.8130	+1.1761	+7.66387	+7.66170

BESSELIAN ELEMENTS OF THE ANNULAR ECLIPSE OF T
NOVEMBER 22, 1919.

LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN, NOV. 22, 1919.

Place.	Beginning.			Middle.		Ending.		
	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.	Greenwich Mean Time.	Magnitude.	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.
	h m	°	°	h m		h m	°	°
Albany, N. Y.	0 46	253	293	2 0	0.43	3 24	138	154
Allegheny, Pa.	0 35	260	305	1 50	0.53	3 16	133	155
Amherst, Mass.	0 47	253	292	2 2	0.43	3 26	130	153
Ann Arbor, Mich.	...	...	...	1 48	0.54	3 10	132	158
Appleton, Wis.	...	...	...	1 46	0.54	3 5	132	160
Atlanta, Ga.	0 22	273	327	1 40	0.72	3 11	122	153
Augusta, Me.	0 56	248	283	2 8	0.37	3 29	142	154
Austin, Tex.	...	...	...	1 29 [1]	0.94 [1]	2 52	108	154
Baton Rouge, La.	...	...	...	1 32	0.87	3 1	113	153
Bismarck, N. Dak.	...	...	...	...	[0.52][2]	2 56	128	162
Buffalo, N. Y.	0 41	256	298	1 54	0.48	3 16	136	157
Cambridge, Mass.	0 49	252	290	2 4	0.41	3 28	140	152
Charleston, W. Va.	0 30	264	312	1 46	0.59	3 14	129	155
Charlottesville, Va.	0 32	263	310	1 49	0.57	3 20	131	153
Cheyenne, Wyo.	...	...	...	...	[0.58][2]	2 51	119	159
Cincinnati, Ohio	...	...	...	1 44	0.60	3 10	128	156
Cleveland, Ohio	0 36	260	304	1 49	0.53	3 13	133	157
Columbia, Mo.	...	...	...	1 38	0.68	3 0	123	158
Columbia, S. C.	0 24	271	323	1 43	0.68	3 17	124	151
Columbus, Ohio	0 32	263	310	1 46	0.57	3 12	130	156
Denver, Colo.	...	...	...	...	[0.62][2]	2 50	117	159
Des Moines, Iowa	...	...	...	1 40	0.64	3 0	126	159
Dover, Del.	0 37	260	304	1 54	0.52	3 24	134	152
Evanston, Ill.	...	...	...	1 44	0.57	3 6	130	159
Flagstaff, Ariz.	...	...	...	...	[0.38][2]	2 43	107	156
Geneva, N. Y.	0 43	255	296	1 56	0.46	3 19	137	156
Greencastle, Ind.	...	...	...	1 42	0.62	3 7	128	157
Hanover, N. H.	0 50	251	288	2 3	0.40	3 25	140	154
Harrisburg, Pa.	0 38	259	302	1 53	0.51	3 21	134	154
Helena, Mont.	...	...	...	...	[0.07][2]	2 51	122	161
Iowa City, Iowa	...	...	...	1 41	0.62	3 2	127	159
Ithaca, N. Y.	0 42	255	296	1 56	0.46	3 20	137	155
Jackson, Miss.	...	...	...	1 34	0.82	3 2	116	154
Kansas City, Mo.	...	...	...	1 37	0.70	2 58	122	158
Little Rock, Ark.	...	...	...	1 34	0.78	3 0	118	156
Louisville, Ky.	...	...	...	1 42	0.64	3 8	126	156
Madison, Wis.	...	...	...	1 44	0.57	3 4	130	160
Minneapolis, Minn.	...	...	...	1 44	0.56	3 1	130	161
Montgomery, Ala.	...	...	...	1 37	0.77	3 9	119	153
Mount Wilson, Cal.	...	...	...	...	[0.05][2]	2 39	102	154
Nashville, Tenn.	...	...	...	1 39	0.69	3 7	123	155
New Haven, Conn.	0 44	254	295	2 0	0.45	3 26	138	152
New Orleans, La.	...	...	...	1 33	0.87	3 2	113	153
New York, N. Y.	0 42	256	298	1 58	0.47	3 25	136	153
Oklahoma City, Okla.	...	...	...	1 32	0.81	2 54	116	157
Omaha, Nebr.	...	...	...	1 38	0.66	2 58	124	159
Orono, Me.	0 59	246	280	2 10	0.35	3 30	144	153

[1] Duration of annular phase $7^m.1$.

[2] Magnitude at sunrise. Mid-eclipse below horizon.

LOCAL CIRCUMSTANCES OF THE ECLIPSE OF THE SUN, NOV. 22, 1919.

Place.	Beginning.			Middle.		Ending.		
	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.	Greenwich Mean Time.	Magnitude.	Greenwich Mean Time.	Angle from North Point.	Angle from Vertex.
	h m	°	°	h m		h m	°	°
Oxford, Miss.	...	...	...	1 36	0.76	3 4	119	155
Panama, Panama	0 23	309	24	1 45	0.64	3 28	92	133
Philadelphia, Pa.	0 39	258	301	1 55	0.50	3 24	135	153
Phoenix, Ariz.	...	...	...	...	[0.39][1]	2 42	104	155
Pierre, S. Dak.	...	...	...	...	[0.60][1]	2 55	125	161
Poughkeepsie, N. Y.	0 44	255	295	2 0	0.45	3 24	137	153
Raleigh, N. C.	0 28	266	316	1 48	0.62	3 21	128	151
Richmond, Va.	0 32	263	310	1 50	0.57	3 22	131	152
Salt Lake City, Utah	...	...	...	...	[0.25][1]	2 47	114	158
San Juan, P. R.	0 27	284	343	2 7	0.86	4 11	113	113
Santa Fe, N. Mex.	...	...	...	...	[0.68][1]	2 47	111	157
Springfield, Ill.	...	...	...	1 40	0.64	3 4	126	158
St. Louis, Mo.	...	...	...	1 39	0.67	3 3	124	157
Syracuse, N. Y.	0 44	254	294	1 57	0.45	3 20	138	156
Tallahassee, Fla.	0 19	278	335	1 38	0.80	3 12	118	151
Topeka, Kans.	...	...	...	1 36	0.71	2 57	121	158
Tuscaloosa, Ala.	...	...	...	1 37	0.77	3 6	119	154
Urbana, Ill.	...	...	...	1 42	0.62	3 5	127	158
Washington, D. C.	0 35	261	306	1 52	0.54	3 21	132	153
Williams Bay, Wis.	...	...	...	1 44	0.57	3 5	130	159

[1] Magnitude at sunrise. Mid-eclipse below horizon.

MEAN PLACES FOR 1919.0. (January $0^d.915$, Greenwich.)

MEAN PLACES FOR 1919.0. (January $0^d.915$, Greenwich.)

Name of Star.		Magnitude.	Right Ascension.			Annual Proper Motion.	Declination.			Annual Proper Motion.
			h	m	s	s	°	′	″	″
n	Tauri	5.1	5	14	24.564	+0.0021	+22	0	49.93	−0.063
351 B.	Tauri	6.2	5	14	27.140	−0.0014	20	3	2.94	−0.029
353 B.	Tauri	6.5	5	16	9.535	+0.0025	19	44	0.46	−0.024
o	Tauri	4.8	5	22	46.133	+0.0006	21	52	8.07	−0.010
372 B.	Tauri	6.1	5	28	49.893	−0.0001	20	25	4.22	−0.013
ζ	Tauri	3.0	5	32	48.190	+0.0006	+21	5	39.09	−0.032
175 H[1].	Tauri	6.5	5	37	10.043	−0.0020	22	37	16.65	+0.018
394 B.	Tauri	6.0	5	38	24.376	+0.0011	23	10	0.60	−0.042
	B. D.+19°1110	6.0	5	47	35.437	−0.0008	19	50	52.54	−0.031
χ^1	Orionis	4.5	5	49	35.160	−0.0126	20	15	44.28	−0.085
57	Orionis	5.8	5	50	8.948	+0.0003	+19	44	5.63	−0.013
141	Tauri	6.3	5	56	48.112	−0.0009	22	24	0.42	−0.011
64	Orionis	5.1	5	58	39.698	+0.0014	19	41	34.80	−0.021
χ^2	Orionis	4.7	5	59	6.581	+0.0011	20	8	29.42	−0.003
14 B.	Geminorum	6.0	6	4	39.532	+0.0021	22	12	14.32	−0.040
68	Orionis	5.7	6	7	13.528	+0.0012	+19	48	35.00	−0.013
6	Geminorum	6.3	6	7	24.521	+0.0007	22	55	40.54	−0.013
η	Geminorum (*var.*)	3.2	6	9	59.344	−0.0039	22	31	53.15	−0.016
71	Orionis	5.1	6	10	4.944	−0.0062	19	11	6.08	−0.194
μ	Geminorum	3.2	6	18	3.648	+0.0046	22	33	22.93	−0.114
15	Geminorum	6.5	6	22	56.982	−0.0015	+20	50	24.60	−0.054
16	Geminorum	6.2	6	23	7.668	−0.0019	20	32	45.37	−0.005
ν	Geminorum	4.1	6	24	9.231	−0.0005	20	15	52.52	−0.016
74 B.	Geminorum	6.2	6	42	39.502	+0.0002	18	16	56.12	−0.056
110 B.	Geminorum	6.2	6	57	42.868	. . . .	17	52	17.30	. . .
ζ	Geminorum (*var.*)	3.7	6	59	18.369	−0.0002	+20	41	24.79	−0.007
162 B.	Geminorum	5.7	7	27	8.235	+0.0018	17	15	35.18	−0.064
f	Geminorum	5.3	7	34	48.004	−0.0002	17	51	36.55	+0.004
g	Geminorum	5.0	7	41	26.200	−0.0048	18	42	31.29	−0.063
1	Cancri	6.0	7	52	23.613	−0.0021	16	0	27.46	−0.044
2 B.	Cancri	6.0	7	53	54.340	+0.0003	+16	44	16.72	+0.004
3	Cancri	5.7	7	56	8.960	−0.0001	17	31	53.64	−0.010
5	Cancri	5.9	7	56	53.413	+0.0004	16	40	46.86	0.000
30 B.	Cancri	6.1	8	6	25.969	−0.0007	14	52	11.61	−0.013
29	Cancri	5.9	8	24	6.227	−0.0017	14	28	47.07	−0.022
84 B.	Cancri	6.4	8	29	15.944	−0.0023	+13	32	5.11	−0.095
90 B.	Cancri	6.3	8	31	35.306	+0.0006	15	35	40.40	−0.027
A^1	Cancri	5.5	8	38	44.665	−0.0002	12	58	20.01	−0.002
A^2	Cancri	5.7	8	42	29.719	−0.0049	12	24	28.73	−0.057
60	Cancri	5.7	8	51	30.324	−0.0009	11	56	10.36	−0.019
α	Cancri	4.3	8	54	3.562	+0.0024	+12	10	19.25	−0.042
κ	Cancri	5.1	9	3	21.729	−0.0012	10	59	41.70	−0.013
209 B.	Cancri	6.5	9	5	22.485	−0.0007	11	53	41.95	−0.079
222 B.	Cancri	6.3	9	13	28.238	+0.0046	11	50	27.75	−0.007
ω	Leonis	5.5	9	24	7.311	+0.0038	9	24	36.52	−0.012
3	Leonis	5.8	9	24	10.482	−0.0023	+ 8	32	33.15	−0.025
h	Leonis	5.2	9	27	37.225	+0.0001	10	4	25.21	−0.013
o	Leonis	3.8	9	36	49.779	−0.0096	10	15	41.67	−0.033
10 B.	Sextantis	6.0	9	41	53.808	+0.0009	7	4	58.70	−0.034
25 B.	Sextantis	6.3	9	49	27.892	+0.0013	6	20	26.33	. . .
89 B.	Leonis	6.2	9	53	50.287	+0.0010	+ 8	42	4.23	−0.029
π	Leonis	4.9	9	55	56.064	−0.0029	8	26	0.29	−0.027
14	Sextantis	6.3	10	2	33.378	−0.0022	6	0	26.04	−0.002
19	Sextantis	5.9	10	8	35.519	−0.0037	5	0	55.81	−0.006
155 B.	Leonis	6.5	10	19	2.243	−0.0167	6	6	20.02	−0.071
237 B.	Leonis	6.3	10	48	4.062	+0.0002	+ 1	27	16.78	−0.055
55	Leonis	6.1	10	51	32.431	+0.0073	1	10	8.35	−0.013
p^3	Leonis	6.1	10	59	27.860	−0.0045	+ 0	26	8.37	+0.008

MEAN PLACES FOR 1919.0. (January 0d.915,

MEAN PLACES FOR 1919.0. (January 0^d.915, Greenwich.)

Name of Star.	Magnitude.	Right Ascension.	Annual Proper Motion.	Declination.	Annual Proper Motion.
		h m s	s	° ′ ″	″
μ Sagittarii	4.0	18 8 55.117	−0.0004	−21 4 52.30	−0.002
14 Sagittarii	5.6	18 9 23.907	−0.0012	21 44 8.89	−0.023
15 Sagittarii	5.3	18 10 22.970	+0.0003	20 45 11.84	+0.006
16 Sagittarii	5.9	18 10 23.814	+0.0005	20 24 47.41	−0.002
Y Sagittarii (*var.*)	5.4	18 16 37.071	....	18 53 49.36	−0.001
21 Sagittarii	5.0	18 20 31.571	0.0000	−20 35 9.80	−0.024
95 B. Sagittarii	5.7	18 25 26.284	+0.0041	18 46 51.53	−0.072
115 B. Sagittarii	5.7	18 33 3.377	−0.0021	21 27 57.95	−0.100
121 B. Sagittarii	5.9	18 34 3.655	−0.0056	21 7 11.20	−0.138
128 B. Sagittarii	6.3	18 40 28.580	+0.0019	21 5 5.78	−0.039
29 Sagittarii	5.3	18 44 51.783	+0.0005	−20 25 4.38	+0.030
33 Sagittarii	5.8	18 49 9.637	−0.0008	21 27 35.96	−0.015
36 Sagittarii	5.1	18 52 31.659	−0.0010	20 45 48.06	−0.011
ξ Sagittarii	3.7	18 52 53.882	+0.0023	21 12 51.35	−0.023
171 B. Sagittarii	6.1	18 58 18.176	0.0000	19 21 50.36	−0.035
173 B. Sagittarii	6.4	18 58 21.691	+0.0020	−19 13 14.96	...
187 B. Sagittarii	6.4	19 2 24.069	+0.0036	18 51 50.68	−0.056
190 B. Sagittarii	5.4	19 3 31.210	+0.0001	19 25 5.51	−0.008
195 B. Sagittarii	6.3	19 5 1.596	+0.0019	19 55 55.75	−0.050
d Sagittarii	5.0	19 12 53.780	−0.0015	19 5 53.38	−0.017
226 B. Sagittarii	6.4	19 16 52.400	+0.0002	−19 23 12.32	+0.009
ρ Sagittarii	4.0	19 16 58.558	−0.0020	18 0 2.87	+0.015
45 Sagittarii	6.0	19 17 7.450	+0.0064	18 27 33.67	−0.082
266 B. Sagittarii	6.1	19 31 42.798	+0.0003	19 1 57.80	−0.009
267 B. Sagittarii	5.8	19 32 21.463	+0.0011	18 24 42.94	−0.002
54 Sagittarii	5.4	19 36 5.044	+0.0046	−16 28 48.10	−0.047
e Sagittarii	5.2	19 37 53.216	+0.0040	16 18 53.51	−0.015
g Sagittarii	5.1	19 53 21.478	+0.0004	15 42 25.67	−0.081
16 B. Capricorni	6.2	20 16 13.612	+0.0025	15 2 27.90	+0.004
β Capricorni	3.2	20 16 27.746	+0.0030	15 2 17.00	+0.007
31 B. Capricorni	6.4	20 24 9.832	+0.0013	−16 0 37.02	+0.019
27 G. Capricorni	6.2	20 26 32.022	−0.0058	15 19 41.61	−0.092
45 B. Capricorni	6.1	20 29 41.204	+0.0035	14 0 2.02	+0.060
τ Capricorni	5.2	20 34 44.718	+0.0006	15 14 22.82	−0.015
84 B. Capricorni	6.0	20 46 14.079	+0.0106	12 50 42.92	−0.034
16 B. Aquarii	6.4	20 48 39.827	+0.0021	−11 52 49.16	+0.065
ν Aquarii	4.5	21 5 10.986	+0.0057	11 42 1.06	−0.006
51 G. Aquarii	6.5	21 9 53.816	−0.0010	10 56 27.70	−0.051
17 Aquarii	6.3	21 18 35.789	−0.0022	9 39 55.01	−0.021
19 Aquarii	5.6	21 20 51.977	+0.0012	10 5 38.63	−0.164
ξ Aquarii	4.8	21 33 26.480	+0.0075	− 8 13 5.17	−0.023
c^1 Capricorni	5.3	21 40 41.216	+0.0004	9 27 17.71	+0.008
c^2 Capricorni	6.3	21 41 57.077	+0.0008	9 39 1.29	+0.001
30 Aquarii	5.6	21 59 0.805	+0.0011	6 54 51.16	+0.016
138 B. Aquarii	6.4	22 8 30.812	−0.0043	5 7 14.09	−0.028
44 Aquarii	5.7	22 12 52.849	−0.0003	− 5 47 31.50	+0.029
51 Aquarii	5.8	22 19 53.756	+0.0011	5 14 50.37	−0.011
187 B. Aquarii	6.3	22 27 7.104	−0.0051	3 19 34.59	−0.004
κ Aquarii	5.2	22 33 33.747	−0.0049	4 38 46.24	−0.113
207 B. Aquarii	6.3	22 36 36.536	....	3 58 32.60	...
6 G. Piscium	6.2	22 54 5.312	+0.0002	− 2 49 45.96	−0.082
3 Piscium	6.3	22 56 28.708	+0.0028	0 14 57.62	+0.014
22 B. Piscium	6.4	23 19 22.620	+0.0043	− 0 9 12.08	+0.038
κ Piscium	4.9	23 22 46.809	+0.0056	+ 0 48 43.44	−0.093
9 Piscium	6.4	23 23 5.844	+0.0032	0 40 39.29	−0.029
16 Piscium	5.7	23 32 15.264	−0.0074	+ 1 39 9.34	+0.057
λ Piscium	4.6	23 37 54.780	−0.0092	1 20 2.93	−0.154
19 Piscium	5.4	23 42 15.097	−0.0034	3 2 14.61	−0.020
22 Piscium	5.8	23 47 49.002	+0.0009	+ 2 28 48.34	−0.011

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

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B.	Geminorum	5.7	+1.34	– 8.2	+17 15.4	1	0 32.0	– 2 19.4	+0.7788	0.5845	–0.1256	+90	+16
	Geminorum	5.3	1.37	8.2	17 51.5		3 42.6	+ 0 44.1	–0.2382	0.5818	0.1313	+25	–41
	Cancri	6.0	+1.41	– 9.2	+16 0.3		11 6.6	+ 7 51.7	+0.6327	0.5756	–0.1436	+84	+ 5
B.	Cancri	6.0	1.42	9.1	16 44.1		11 45.2	+ 8 28.9	[illegible]	0.5750	0.1446	+26	–40
	Cancri	5.7	1.43	8.9	17 31.7		12 42.6	+ 9 24.2	–1.1568	0.5742	0.1461	–35	–73
	Cancri	6.9	1.43	9.2	16 40.6		13 1.6	+ 9 42.5	[illegible]	0.5738	0.1466	+20	–48
B.	Cancri	6.1	1.45	9.9	14 52.0		17 7.8	–10 20.2	+0.9080	0.5704	0.1527	+90	+21
	Cancri	5.9	+1.51	–10.5	+14 28.6	2	0 51.6	– 2 52.8	+0 0899	0.5640	–0.1632	+43	–26
B.	Cancri	6.4	1.52	10.9	13 31.9		3 9.0	– 0 40.2	+0 6883	0.5621	0.1661	+90	+ 6
	Cancri	5.5	1.56	11.3	12 58.1		7 23.7	+ 3 25.7	+0.5559	0.5586	0.1711	+75	– 2
	Cancri	5.7	1.57	11.6	12 24.3		9 5.4	+ 5 4.0	+0.8498	0.5573	0.1730	+90	+15
	Cancri	5 7	1.61	11.9	11 56.0		13 11.5	+ 9 1.8	+0 6229	0.5540	0.1774	+82	+ 1
	Cancri	4 3	+1.62	–11.9	+12 10.1		14 21.8	+10 9.7	+0.1695	0.5532	–0.1785	+48	–23
	Cancri	5 1	1.65	12.5	10 59.5		18 30.7	– 9 41.0	+0.6210	0.5499	0.1826	+81	0
B.	Cancri	6.5	1.67	12.2	11 53.5		19 35.9	– 8 46.7	–0 4899	0.5492	0.1834	+11	–64
B.	Cancri	6.3	1.70	12.4	11 50.3		23 23.4	– 5 6.7	–1.1371	0.5464	0.1866	–31	–79
	Leonis	5.5	1.74	13.4	9 24.4	3	4 26.0	- 0 13.9	+0.4596	0.5429	0.1905	+67	–11
	Leonis	5.2	+1.76	–13.2	+10 4.2		6 6.2	+ 1 23.2	–0.5570	0.5417	–0.1916	+ 8	–70
B.	Sextantis	6.0	1.81	14.5	7 4.7		12 59.5	+ 8 3.3	+1 2612	0.5373	0.1959	+90	+45
B.	Sextantis	6.3	1.85	14.8	6 20.2		16 41.3	+11 38.1	+1 3215	0 5350	0.1978	+84	+54
	Sextantis	6.3	1.91	15.1	6 0.2		23 9.1	– 6 6.1	+0 3903	0 5314	0.2007	+62	–15
	Sextantis	5.9	1.94	15.5	5 0.7	4	2 9.6	– 3 11.1	+0.8410	0 5298	0 2018	+90	+10
B.	Leonis	6.3	+2.15	–16.9	+ 1 27.0		22 14.2	– 7 42.7	+0.5641	0 5212	–0.2056	+75	– 7
	Leonis	6.1	2.17	17.0	1 9.9	5	0 1.9	– 5 58.2	+0.5034	0.5207	0.2056	+70	–11
	Leonis	6 1	2 21	17 3	0 25.9		4 8 5	– 1 58 8	+0 4506	0.5194	0.2056	+66	–14
	Leonis	5.3	2.27	17.2	+ 0 22.0		9 26.0	+ 3 9.3	–0.5671	0.5180	0.2052	+ 7	–75
B.	Leonis	6.3	2.35	17.7	– 1 15.5		16 51.1	+10 21.6	–0.3231	0.5165	0.2040	+20	–57
	Leonis	5.1	+2.37	–18.1	– 2 33.7		18 7.5	+11 35.8	+0.8335	0.5163	–0.2037	+88	+ 8
B.	Leonis	6.2	2.41	17.8	1 59.6		22 23.2	– 8 15.9	–0.6513	0.5156	0.2027	+ 2	–83
B.	Virginis	5.9	2 50	18.6	4 53 3	6	5 3.9	– 1 46 8	+1.1608	0.5150	0.2006	+86	+32
B.	Virginis	6.5	2.64	18.1	5 16.4		17 21.8	+10 9 9	–0.8528	0.5147	0.1954	–10	–90
	Virginis	5.3	2.78	18.9	9 0.6	7	3 41.2	– 3 48.4	+1.2668	0 5154	0 1896	+81	+44
	Virginis	4.8	+2.80	–18.2	– 7 33.3		6 34.7	– 1 0.0	–0.8812	0.5157	–0.1877	–13	–90
	Virginis	5.0	2.91	18.2	9 6.3		14 31.8	+ 6 43.3	–0.6452	0.5168	0.1821	0	–84
	Virginis	5.2	3.00	17.9	10 18.8		21 37.6	–10 23 2	–0.5843	0 5183	0.1765	+ 3	–78
	Virginis	6.2	3.01	17.7	9 54.2		22 36.1	– 9 26.5	–1.2098	0.5185	0.1757	–41	–90
	Virginis	5.7	3.14	17.6	12 17.5	8	7 25.7	– 0 52.3	–0.0840	0.5206	0 1678	+29	–43
B.	Virginis	6.0	+3.19	–17.3	–12 48.2		11 32.3	+ 3 7.1	–0.1977	0.5217	–0.1638	+22	–50
B.	Virginis	6.4	3.38	16.0	14 35.2	9	2 46.6	– 6 5.8	–0.5950	0.5266	0.1473	– 1	–79
G.	Virginis	6.5	3.41	16.3	15 57.2		3 9.6	– 5 43.6	+0.8644	0.5267	0.1469	+75	+11
H.	Virginis	5.1	3.44	15.9	15 55.5		6 0.1	– 2 58.2	+0.4200	0.5277	0.1434	+55	–15
	Libræ	*4.7*	*3.81*	12.0	19 29.4	10	12 23.8	+ 2 29.3	+0.6300	0.5389	0.1014	+65	– 2
	Libræ	*6.0*	*+3.81*	–11.8	–19 20.8		12 56.0	+ 3 0.5	+0.4172	0.5391	–0.1006	+50	–[illegible]

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JUNE.

JULY.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

JULY.

AUGUST.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

AUGUST.

SEPTEMBER.

10

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

ELEMENTS FOR THE OF OCCULTATIONS

a

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

SEPTEMBER.

ELEMENTS FOR THE OF OCCULTATIONS.

OCTOBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

The Star's						At Conjunction in R. A.					
Name.		Mag.	Red'ns from 1919.0. Δα	Red'ns from 1919.0. Δδ	Apparent Declination.	Greenwich Mean Time.		Hour Angle, H	Y	x'	y'
			s	″	° ′	d	h m	h m			
71	Orionis	5.1	+4.17	−4.4	+19 11.0	14	7 41.3	−8 59.7	+1.1065	0.5952	−0.053
15	Geminorum	6.5	4.15	6.1	20 50.3		12 50.4	−4 2.6	−0.8762	0.5924	0.065
16	Geminorum	6.2	4.14	6.0	20 32.7		12 54.7	−3 58.5	−0.5825	0.5924	0.065
ν	Geminorum	4.1	4.12	6.0	20 15.8		13 19.5	−3 34.6	−0.3244	0.5921	0.066
74 B.	Geminorum	6.2	3.96	7.1	18 16.8		20 49.6	+3 38.2	+1.1356	0.5878	0.082
110 B.	Geminorum	6.2	+3.86	−8.3	+17 52.2	15	3 0.8	+9 35.4	+1.0123	0.5840	−0.094
162 B.	Geminorum	5.7	3.66	10.6	17 15.4		15 20.9	−2 31.9	+0.3380	0.5761	0.117
f	Geminorum	5.3	3.62	11.4	17 51.4		18 37.0	+0 37.1	−0.6710	0.5740	0.122
1	Cancri	6.0	3.47	12.1	16 0.3	16	2 13.0	+7 56.7	+0.2608	0.5690	0.134
2 B.	Cancri	6.0	3.48	12.5	16 44.1		2 52.6	+8 34.9	−0.5832	0.5686	0.135
5	Cancri	5.9	+3.46	−12.6	+16 40.6		4 10.9	+9 50.5	−0.7016	0.5677	−0.137
30 B.	Cancri	6.1	3.36	12.7	14 52.0		8 22.7	−10 6.6	+0.5815	0.5650	0.143
29	Cancri	5.9	3.24	13.7	14 28.6		16 15.7	−2 30.0	−0.1878	0.5600	0.154
84 B.	Cancri	6.4	3.19	13.7	13 31.9		18 35.5	−0 14.9	+0.4333	0.5585	0.157
[illegible]	Cancri	5.5	3.13	14.0	12 58.1		22 54.1	+3 54.9	+0.3321	0.5558	0.162
42	Cancri	5.7	+3.09	−14.0	+12 24.2	17	0 37.1	+5 34.5	+0.6413	0.5548	−0.164
60	Cancri	5.7	3.03	14.3	11 55.9		4 46.2	+9 35.2	−0.4446	0.5525	0.168
α	Cancri	4.3	3.02	14.6	12 10.1		5 57.2	−10 43.9	−0.0026	0.5517	0.170
κ	Cancri	5.1	2.95	14.6	10 59.5		10 17.4	−9 4.5	−0.4860	0.5493	0.174
209 B.	Cancri	6.5	2.95	15.0	11 53.4		11 14.0	−8 9.8	−0.6237	0.5488	0.175
222 B.	Cancri	6.3	+2.91	−15.3	+11 50.2		15 2.7	−4 28.5	−1.2427	0.5467	−0.178
ω	Leonis	5.5	2.82	15.0	9 24.4		20 6.3	−0 25.2	−0.4027	0.5441	0.182
3	Leonis	5.8	2.81	14.7	8 32.3		20 7.8	+0 26.7	−1.3129	0.5441	0.182
5	Leonis	5.2	2.81	15.3	10 4.2		21 46.7	+2 2.4	−0.6038	0.5433	0.183
10 B.	Sextantis	6.0	2.70	14.9	7 4.7	18	4 39.5	+8 42.1	−1.2762	0.5401	0.188
14	Sextantis	6.3	+2.59	−15.2	−6 0.2		14 45.5	−5 31.0	+0.4874	0.5359	−0.194
19	Sextantis	5.9	2.56	15.0	5 0.7		17 44.3	−2 37.7	−0.9627	0.5348	0.195
155 B.	Leonis	6.5	2.50	15.6	6 6.1		22 55.6	−2 24.0	−1.2182	0.5330	0.197
237 B.	Leonis	6.3	2.38	14.8	1 27.0	19	13 31.3	−7 27.0	−0.8482	0.5290	0.200
[illegible]	Leonis	6.[illegible]	2.38	14.7	1 9.9		15 17.0	−5 44.5	−0.8019	0.5287	0.200
	Leonis	6.[illegible]	−2.34	−14.6	−0 25.9		19 18.7	−1 50.0	−0.7815	0.5279	−0.201
	Leonis	5.[illegible]	2.30	14.6	−0 22.0	20	0 29.3	−3 11.3	−0.1900	0.5270	0.201
[illegible] B.	Leonis	6.[illegible]	2.26	14.3	−1 15.5		7 44.0	−10 13.1	−0.1089	0.5260	0.200
[illegible]	Leonis	5.[illegible]	2.26	14.0	2 33.6		8 58.6	−11 25.5	−1.2675	0.5260	0.200
[illegible] B.	Leonis	6.2	2.23	14.[illegible]	[illegible] 59.5		13 7.9	−8 32.6	−0.1766	0.5256	0.199
8 B.	Virginis	6.[illegible]	−2.17	−13.2	−3 26.3	21	7 36.5	−9 23.1	−0.2475	0.5252	−0.192
					NEW	MOON.					
[illegible] B.	Libræ	6.[illegible]	[illegible]	[illegible]	−13 53.4	25	10 38.2	−9 24.1	−1.1212	0.5418	−0.085
[illegible] B.	Libræ	5.[illegible]	[illegible]	[illegible]	[illegible]		11 4.3	−9 49.4	−0.5363	0.5418	0.085
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		14 7.0	−11 13.7	−0.1147	0.5424	−0.080
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	−9 48.5	−0.1930	0.5426	0.077
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	−4 30.4	−0.3571	0.5434	0.068
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	−3 43.0	[illegible]	0.5436	0.067
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	−2 29.9	−1.1325	0.5438	0.065
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	26	[illegible]	[illegible]	[illegible]	0.5442	−0.059
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	0.5442	0.059
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	−0.5310	0.5444	0.057
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	−0.7372	0.5444	0.057
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	0.5446	0.053
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	0.5448	−0.05[illegible]

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

OCTOBER.

NOVEMBER.

ELEMENTS FOR THE OF OCCULTATIONS.

6

ELEMENTS FOR THE OF OCCULTATIONS.

ELEMENTS FOR THE OF OCCULTATIONS.

DECEMBER.

22 B.	Piscium	6.4	+3.85	+27.2	− 0 8.7	1	5 13.4	− 1 27.9	+0.9727	0.5444	+0.2069
κ	Piscium	4.9	+3.87	+27.4	+ 0 49.2		6 50.5	+ 0 6.0	+0.3066	0.5450	+0.2070
9	Piscium	6.4	3.87	27.4	0 41.1		6 59.5	+ 0 14.6	+0.4770	0.5451	0.2070
16	Piscium	5.7	3.92	27.7	1 39.6		11 19.5	+ 4 26.3	+0.3646	0.5470	0.2070
λ	Piscium	4.6	3.94	27.3	1 20.5		13 59.2	+ 7 0.7	[illegible]	[illegible]	[illegible]
19	*Piscium*	5.4	3.98	27.9	3 2.7		16 1.2	+ 8 58.7	−0.0917	0.5492	0.2067
22	*Piscium*	5.8	+4.02	+27.6	+ 2 29.3		18 37.1	+11 29.5	+1.0170	0.5505	[illegible]

ELEMENTS FOR THE PREDICTION OF OCCULTATIONS.

DECEMBER.

ELEMENTS FOR THE OF OCCULTATIONS.

ELEMENTS FOR THE OF OCCULTATIONS.

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	The Star's Name.	Mag.	Immersion. Washington. Sidereal Time.	Immersion. Washington. Mean Time.	Immersion. Angle from— North Point.	Immersion. Angle from— Vertex.	Emersion. Washington. Sidereal Time.	Emersion. Washington. Mean Time.	Emersion. Angle from— North Point.	Emersion. Angle from— Vertex.	Duration of Occultation.
			h m	h m	°	°	h m	h m	°	°	h m
Jan. 7	19 Piscium	5.4	1 39	6 33	88	54	2 44	7 38	214	171	1 5
10	27 Arietis	6.4	1 54	6 36	352	9	2 15	6 57	322	328	0 21
11	14 H¹. Tauri	6.5	6 22	11 0	82	338	7 5	11 42	319	263	0 43
11	22 H¹. Tauri	6.1	8 52	13 29	47	352	9 35	14 12	310	256	0 43
15	*f* Geminorum	5.3	5 26	9 48	138	185	6 34	10 56	253	283	1 8
19	*p*³ Leonis	6.1	7 0	11 6	147	195	8 3	12 9	266	308	1 3
Feb. 8	51 Tauri	5.6	4 36	7 24	84	69	5 59	8 46	266	219	1 23
8	56 Tauri	5.2	5 32	8 20	45	5	6 32	9 19	309	257	1 0
8	247 B. Tauri	5.8	9 40	12 27	75	19	10 34	13 21	291	238	0 54
9	108 Tauri	6.2	3 6	5 50	13	64	3 30	6 14	337	24	0 24
9	*n* Tauri	5.1	4 50	7 34	81	98	6 13	8 57	282	248	1 23
9	*o* Tauri	4.8	9 34	12 17	69	11	10 28	13 10	310	254	0 54
10	15 Geminorum	6.5	10 8	12 47	71	14	11 1	13 40	320	263	0 53
10	16 Geminorum	6.2	10 20	12 59	133	77	11 17	13 55	257	201	0 56
12	29 Cancri ‡	5.9	15 8	17 39	64	14	15 44	18 14	334	287	0 35
14	14 Sextantis	6.3	14 29	16 52	93	42	15 27	17 49	318	266	0 57
15	237 B. Leonis	6.3	13 24	15 48	115	76	14 38	16 56	303	256	1 14
15	55 Leonis	6.1	15 39	17 57	77	27	16 28	18 46	331	280	0 49
21	147 B. Libræ †	6.2	10 14	12 10	78	129	11 11	13 7	319	4	0 57
Mar. 6	54 Arietis	6.5	9 5	10 10	95	42	9 57	11 2	255	206	0 52
8	ι Tauri	4.7	6 6	7 3	137	100	7 4	8 1	229	178	0 58
8	105 Tauri	6.0	8 34	9 31	88	31	9 40	10 37	286	229	1 6
11	2 B. Cancri	6.0	7 47	8 32	75	78	8 54	9 39	331	303	1 7
12	α Cancri	4.3	13 16	13 57	66	13	13 57	14 37	343	290	0 41
20	ι Libræ	4.7	10 23	10 32	91	139	11 29	11 38	309	350	1 6
24	128 B. Sagittarii	6.3	13 59	13 52	96	143	15 10	15 3	260	300	1 11
Apr. 8	*A*¹ Cancri	5.5	13 20	12 14	105	52	14 19	13 14	300	248	0 59
9	ω Leonis	5.5	10 32	9 23	127	102	11 53	10 44	294	251	1 21
11	*p*³ Leonis	6.1	11 18	10 1	104	98	12 39	11 22	321	293	1 21
21	226 B. Sagittarii	6.4	16 7	14 10	70	107	17 28	15 31	270	294	1 21
May 4	162 B. Geminorum ‡	5.7	13 48	11 0	109	57	14 39	11 51	284	236	0 51
8	237 B. Leonis	6.3	14 3	10 59	52	8	14 33	11 29	2	316	0 30
14	147 B. Libræ	6.2	11 52	8 25	152	193	12 47	9 20	246	278	0 55
14	172 B. Libræ	5.9	16 59	13 31	99	80	18 27	14 59	274	240	1 28
17	14 Sagittarii	5.6	17 8	13 29	89	102	18 41	15 1	255	248	1 32
18	195 B. Sagittarii	6.3	19 38	15 54	102	94	20 52	17 8	220	197	1 14
26	19 Arietis	5.8	20 0	15 44	66	118	20 52	16 37	254	308	0 53
June 2	60 Cancri	5.7	13 38	8 56	70	17	14 21	9 39	336	284	0 43
15	267 B. Sagittarii †	5.8	14 25	8 52	48	97	15 20	9 47	298	343	0 55
16	27 G. Capricorni	6.2	15 53	10 16	87	134	17 4	11 26	244	284	1 10
23	π Arietis	5.2	21 12	15 6	57	110	22 6	16 1	265	320	0 54
29	84 B. Cancri ‡	6.4	15 6	8 38	83	32	15 51	9 22	315	267	0 45
July 12	226 B. Sagittarii	6.4	15 38	8 18	76	117	16 56	9 36	267	297	1 18
18	51 Piscium	5.6	18 11	10 28	90	141	19 3	11 19	224	276	0 51
21	175 B. Arietis	6.4	21 2	13 6	116	168	21 42	13 46	212	266	0 40
23	ζ Tauri	3.0	0 9	16 5	55	110	1 0	16 56	295	352	0 51
Aug. 7	14 Sagittarii	5.6	20 39	11 37	142	111	21 12	12 9	190	154	0 32

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.
† *Immersion below* the horizon of Washington. ‡ Emersion below the horizon of Washington.

OCCULTATIONS VISIBLE AT WASHINGTON.

Date.	The Star's Name.		Mag.	Immersion. Washington. Sidereal Time.	Immersion. Washington. Mean Time.	Immersion. Angle from— North Point.	Immersion. Angle from— Vertex.	Emersion. Washington. Sidereal Time.	Emersion. Washington. Mean Time.	Emersion. Angle from— North Point.	Emersion. Angle from— Vertex.	Duration of Occultation.
				h m	h m	°	°	h m	h m	°	°	h m
Aug. 11	c^1 Capricorni		5.3	20 44	11 25	80	94	22 2	12 43	222	216	1 18
12	κ Aquarii		5.2	21 30	12 8	107	124	22 24	13 2	191	193	0 54
12	207 B. Aquarii		6.3	23 48	14 25	64	44	1 3	15 40	234	199	1 15
13	22 B. Piscium		6.4	17 55	8 30	64	116	18 56	9 30	249	298	1 0
13	16 Piscium		5.7	2 17	16 50	57	16	3 26	17 59	250	202	1 9
17	53 Arietis		6.0	20 18	10 36	66	116	21 9	11 27	262	315	0 51
18	ω Tauri		4.8	0 49	15 2	50	106	1 52	16 6	283	335	1 3
31	25 Libræ		6.0	17 6	6 30	127	101	18 22	7 46	251	213	1 16
Sept. 5	267 B. Sagittarii		5.8	20 43	9 46	91	75	21 58	11 1	226	195	1 15
8	51 Aquarii	‡	5.8	3 29	16 19	40	350	4 20	17 10	273	221	0 51
16	χ^1 Orionis	†	4.5	22 20	10 40	81	127	23 10	11 30	273	324	0 50
16	χ^2 Orionis		4.7	2 29	14 48	137	193	3 18	15 37	221	274	0 49
18	1 Cancri		6.0	1 34	13 46	110	162	2 31	14 42	266	320	0 56
Oct. 1	21 Sagittarii	‡	5.0	22 31	9 52	57	13	23 34	10 54	274	223	1 3
2	*d* Sagittarii		5.0	23 17	10 34	146	102	23 35	10 52	176	130	0 18
5	c^1 Capricorni		5.3	18 27	5 33	98	138	19 33	6 38	215	245	1 6
6	κ Aquarii		5.2	19 1	6 3	91	135	20 6	7 7	217	252	1 5
6	207 B. Aquarii		6.3	21 18	8 19	36	57	22 30	9 31	264	266	1 12
8	51 Piscium		5.6	23 6	10 0	64	91	0 23	11 16	238	240	1 16
13	372 B. Tauri	†	6.1	22 15	8 48	36	84	22 48	9 21	314	5	0 33
16	84 B. Cancri	†	6.4	1 17	11 38	101	150	2 11	12 32	280	331	0 54
16	A^1 Cancri		5.5	6 4	16 24	107	154	7 25	17 46	293	323	1 21
17	ω Leonis	†	5.5	2 48	13 5	114	165	3 44	14 2	276	329	0 57
Nov. 2	44 Aquarii		5.7	23 9	8 24	346	330	23 32	8 47	313	292	0 23
2	51 Aquarii		5.8	2 52	12 7	82	34	3 50	13 4	230	179	0 58
7	124 B. Arietis		6.4	20 35	5 31	136	187	20 59	5 55	190	243	0 24
7	53 Arietis		6.0	3 19	12 13	68	60	4 35	13 30	264	224	1 16
8	43 Tauri		5.5	1 49	10 40	130	180	2 34	11 24	205	246	0 45
9	*l* Tauri		5.2	23 1	7 49	66	120	23 53	8 41	278	334	0 52
10	68 Orionis		5.7	23 19	8 3	65	115	0 7	8 50	292	346	0 48
11	162 B. Geminorum		5.7	8 54	17 32	54	16	9 36	18 14	346	300	0 42
14	14 Sextantis		6.3	5 6	13 33	123	175	6 12	14 38	279	328	1 6
27	16 B. Capricorni		6.2	23 35	7 12	19	340	0 24	8 1	293	248	0 49
27	β Capricorni		3.2	23 40	7 17	26	345	0 34	8 11	287	241	0 54
28	ν Aquarii		4.5	23 14	6 47	49	20	0 29	8 1	256	215	1 15
29	30 Aquarii		5.6	2 38	10 6	33	345	3 30	10 58	278	228	0 52
Dec. 2	51 Piscium		5.6	0 2	7 18	89	99	1 12	8 29	213	197	1 10
7	χ^1 Orionis		4.5	6 56	13 52	86	51	8 8	15 4	292	241	1 12
7	64 Orionis		5.1	11 15	18 11	122	67	12 5	19 0	259	207	0 50
9	1 Cancri		6.0	5 17	12 5	77	126	6 24	13 13	313	350	1 8
10	A^2 Cancri		5.7	2 2	8 47	139	190	2 45	9 30	244	297	0 43
10	60 Cancri		5.7	6 20	13 4	116	161	7 38	14 22	287	316	1 18
13	388 B. Leonis		6.3	6 17	12 50	55	106	6 51	13 24	353	42	0 34
18	11 H. Libræ	†	5.4	10 16	16 29	106	156	11 23	17 35	289	334	1 6
28	9 Piscium		6.4	3 41	9 15	64	15	4 44	10 18	250	198	1 3
28	κ Piscium		4.9	3 46	9 20	27	338	4 36	10 9	287	236	0 49

NOTE.—The angles of position are counted from the north point and vertex of the Moon's limb toward the east.
† Immersion below the horizon of Washington. ‡ Emersion below the horizon of Washington.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF THE SUN.

FOR GREENWICH MEAN NOON.

Date.	P	B_0	L_0	Date.	P	B_0	L_0
	°	°	°		°	°	°
Jan. 1	+ 2.23	−3.10	247.64	July 5	− 1.10	+3.37	325.87
6	− 0.20	3.67	181.79	10	+ 1.17	3.89	259.70
11	2.62	4.21	115.94	15	3.42	4.38	193.53
16	5.00	4.72	50.10	20	5.64	4.85	127.37
21	7.31	5.19	344.27	25	7.79	5.28	61.22
26	− 9.54	−5.62	278.44	30	+ 9.87	+5.68	355.09
31	11.68	6.00	212.60	Aug. 4	11.87	6.03	288.96
Feb. 5	13.70	6.34	146.77	9	13.78	6.35	222.85
10	15.60	6.62	80.94	14	15.58	6.62	156.75
15	17.37	6.86	15.10	19	17.26	6.85	90.66
20	−19.00	−7.04	309.26	24	+18.83	+7.02	24.59
25	20.48	7.16	243.40	29	20.27	7.15	318.53
Mar. 2	21.80	7.23	177.54	Sept. 3	21.57	7.23	252.48
7	22.97	7.25	111.67	8	22.73	7.25	186.45
12	23.97	7.21	45.78	13	23.74	7.22	120.43
17	−24.81	−7.11	339.88	18	+24.60	+7.14	54.42
22	25.48	6.96	273.96	23	25.30	7.01	348.42
27	25.97	6.76	208.02	28	25.84	6.83	282.43
Apr. 1	26.28	6.51	142.07	Oct. 3	26.21	6.59	216.46
6	26.42	6.21	76.10	8	26.40	6.31	150.49
11	−26.37	−5.87	10.10	13	+26.40	+5.97	84.53
16	26.14	5.48	304.08	18	26.22	5.60	18.57
21	25.73	5.06	238.04	23	25.85	5.17	312.63
26	25.13	4.60	171.99	28	25.29	4.71	246.69
May 1	24.34	4.11	105.92	Nov. 2	24.53	4.22	180.76
6	−23.38	−3.59	39.82	7	+23.57	+3.68	114.84
11	22.24	3.05	333.71	12	22.41	3.12	48.91
16	20.93	2.48	267.59	17	21.07	2.54	343.00
21	19.46	1.90	201.44	22	19.53	1.93	277.10
26	17.83	1.31	135.29	27	17.82	1.31	211.20
31	−16.06	−0.71	69.13	Dec. 2	+15.95	+0.68	145.30
June 5	14.16	−0.11	2.96	7	13.93	+0.04	79.41
10	12.16	+0.49	296.78	12	11.78	−0.60	13.53
15	10.06	1.09	230.60	17	9.52	1.24	307.65
20	7.88	1.68	164.42	22	7.18	1.87	241.79
25	− 5.65	+2.26	98.23	27	+ 4.78	−2.48	175.93
30	− 3.38	+2.83	32.05	32	+ 2.35	−3.07	110.07

In the above table, P is the position-angle of the axis of rotation measured eastward from the north point of the disk, while L_0 and B_0 are the heliographic longitudes and latitudes, respectively, of the center of the disk. The longitudes are reckoned from the Solar Meridian which *passed through the* ascending node of the Sun's equator on the ecliptic, on January 1, 1854, Greenwich *Mean Noon.*

MEAN EQUATOR, ORBIT, AND MEAN LONGITUDE.

FOR MEAN NOON.

Daily motion of Γ′ . . . . +6′.684
Daily motion of ☊ . . . . −3′.177

EPHEMERIS FOR PHYSICAL OF THE MOON.

FOR MEAN

EPHEMERIS FOR OBSERVATIONS OF THE MOON.

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FOR GREENWICH MEAN NOON.

Date.		k	i	θ	L	Stellar Mag.	Date.		k	i	θ	L	Stellar Mag.
			°	°						°	°		
Jan.	1	0.451	96	192	48.3	+0.2	July	5	0.648	73	11	37.3	+0.1
	6	0.599	79	188	44.5	0.0		10	0.569	82	15	34.5	0.3
	11	0.704	66	184	38.3	−0.1		15	0.491	91	18	32.7	0.6
	16	0.779	56	180	33.2	0.1		20	0.412	100	21	31.3	0.8
	21	0.834	48	175	29.6	0.2		25	0.327	110	24	30.4	1.0
	26	0.876	41	170	27.4	−0.2		30	0.236	122	28	25.7	+1.3
	31	0.910	35	165	26.4	0.3	Aug.	4	0.148	136	33	18.9	1.7
Feb.	5	0.937	29	159	26.5	0.4		9	0.068	152	44	9.3	2.2
	10	0.961	23	153	27.8	0.6		14	0.012	167	87	2.2	2.9
	15	0.981	16	144	30.4	0.8		19	0.034	150	168	6.1	2.4
	20	0.995	8	123	34.9	−1.1		24	0.135	137	187	22.0	+1.4
	25	0.997	6	80	41.7	1.3		29	0.307	113	194	45.3	+0.5
Mar.	2	0.978	17	349	51.3	1.3	Sept.	3	0.519	88	200	63.3	−0.2
	7	0.916	34	340	62.5	1.2		8	0.724	63	205	69.4	0.3
	12	0.791	54	335	70.7	1.0		13	0.874	42	210	68.5	1.1
	17	0.605	78	332	68.7	−0.5		18	0.958	24	216	52.7	−1.2
	22	0.395	102	330	54.6	+0.2		23	0.998	10	230	42.8	1.3
	27	0.208	126	327	33.6	1.0		28	0.999	4	329	35.4	1.2
Apr.	1	0.074	148	321	13.3	1.9	Oct.	3	0.990	11	13	30.5	0.9
	6	0.008	170	296	1.6	2.9		8	0.974	18	20	27.5	0.6
	11	0.014	166	174	2.6	+2.8		13	0.953	25	22	26.0	−0.5
	16	0.075	148	158	11.7	2.1		18	0.928	31	23	25.6	0.3
	21	0.161	133	154	21.1	1.5		23	0.897	37	22	26.3	0.2
	26	0.254	120	153	27.2	1.2		28	0.858	44	21	28.2	0.2
May	1	0.342	108	152	30.6	0.9	Nov.	2	0.807	52	19	31.5	0.1
	6	0.426	98	152	32.7	+0.7		7	0.739	61	17	36.3	−0.1
	11	0.508	89	152	34.6	0.5		12	0.643	73	14	42.5	−0.1
	16	0.591	80	153	37.3	+0.2		17	0.507	89	12	48.2	+0.1
	21	0.678	69	155	41.3	−0.1		22	0.322	111	11	46.2	0.5
	26	0.773	57	158	47.3	0.5		27	0.116	140	9	24.4	1.4
	31	0.871	42	162	55.2	−0.9	Dec.	2	0.002	175	325	0.5	+2.9
June	5	0.955	24	169	63.3	1.4		7	0.090	145	204	20.3	1.5
	10	0.998	5	202	67.4	1.9		12	0.302	113	200	47.8	+0.5
	15	0.980	16	343	64.4	1.6		17	0.505	89	197	52.7	0.0
	20	0.911	35	354	56.5	1.1		22	0.656	72	194	46.5	−0.2
	25	0.822	50	1	48.2	−0.6		27	0.759	59	190	39.1	−0.2
	30	0.732	62	6	41.7	−0.2		32	0.830	49	186	33.3	−0.3

NOTATION.

k = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

i = the angle between the Sun and Earth, as seen from the planet.

θ = the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

L = the brilliancy of the disk. The unit of L is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

FOR GREENWICH MEAN NOON.

Date.	k	i	θ	L	Stellar Mag.	Date.	k	i	θ	L	Stellar Mag.
		°	°					°	°		
Jan. 1	0.988	12.6	358.2	48.2	−3.4	July 5	0.490	91.1	19.2	139.6	−4.0
6	0.985	14.3	355.7	48.5	3.4	10	0.462	94.4	20.5	147.8	4.0
11	0.981	15.9	353.3	48.9	3.4	15	0.431	97.9	21.7	156.4	4.0
16	0.977	17.5	351.0	49.3	3.4	20	0.399	101.6	22.8	165.0	4.1
21	0.972	19.2	348.9	49.8	3.4	25	0.365	105.7	23.9	173.3	4.1
26	0.967	20.8	346.9	50.3	−3.4	30	0.329	110.0	25.1	180.6	−4.2
31	0.962	22.5	345.1	50.9	3.3	Aug. 4	0.290	114.8	26.4	185.7	4.2
Feb. 5	0.956	24.2	343.5	51.5	3.3	9	0.249	120.1	27.9	186.6	4.2
10	0.950	25.9	342.1	52.2	3.3	14	0.206	126.0	29.8	181.3	4.2
15	0.943	27.6	341.0	53.0	3.3	19	0.162	132.6	32.3	166.9	4.1
20	0.936	29.4	340.1	53.9	−3.3	24	0.118	139.9	36.0	141.4	−4.0
25	0.928	31.2	339.4	54.8	3.4	29	0.076	148.0	41.7	105.3	3.8
Mar. 2	0.920	33.0	339.0	55.8	3.4	Sept. 3	0.042	156.5	51.8	64.4	3.6
7	0.911	34.8	338.8	56.9	3.4	8	0.019	164.3	72.8	31.0	3.3
12	0.901	36.7	338.8	58.1	3.4	13	0.011	167.9	117.1	19.2	3.2
17	0.891	38.6	339.1	59.3	−3.4	18	0.021	163.4	158.2	35.3	−3.4
22	0.880	40.5	339.6	60.7	3.4	23	0.046	155.2	176.8	72.5	3.7
27	0.869	42.5	340.3	62.2	3.4	28	0.082	146.6	185.9	116.8	3.9
Apr. 1	0.857	44.5	341.3	63.8	3.4	Oct. 3	0.125	138.6	191.1	155.7	4.1
6	0.844	46.5	342.6	65.5	3.4	8	0.171	131.2	194.6	183.2	4.2
11	0.831	48.6	344.1	67.3	−3.4	13	0.216	124.6	197.1	198.9	−4.3
16	0.817	50.7	345.8	69.3	3.4	18	0.259	118.8	199.0	204.9	4.3
21	0.802	52.8	347.7	71.5	3.5	23	0.300	113.5	200.6	204.2	4.3
26	0.787	55.0	349.7	73.8	3.5	28	0.339	108.8	201.8	199.2	4.3
May 1	0.771	57.2	352.0	76.3	3.5	Nov. 2	0.375	104.5	202.8	191.6	4.2
6	0.754	59.5	354.3	79.1	−3.5	7	0.408	100.5	203.6	182.8	−4.2
11	0.737	61.8	356.7	82.1	3.5	12	0.440	96.9	204.1	173.5	4.2
16	0.718	64.1	359.2	85.3	3.6	17	0.470	93.5	204.4	164.1	4.1
21	0.699	66.5	1.7	88.8	3.6	22	0.498	90.3	204.4	155.1	4.1
26	0.680	68.9	4.1	92.7	3.6	27	0.524	87.3	204.2	146.6	4.0
31	0.659	71.4	6.5	96.9	−3.7	Dec. 2	0.549	84.4	203.8	138.6	−4.0
June 5	0.638	74.0	8.7	101.5	3.7	7	0.573	81.7	203.1	131.2	3.9
10	0.616	76.6	10.8	106.6	3.7	12	0.595	79.0	202.1	124.3	3.9
15	0.593	79.3	12.8	112.2	3.8	17	0.617	76.5	200.9	117.9	3.8
20	0.569	82.1	14.6	118.2	3.8	22	0.637	74.1	199.5	112.0	3.8
25	0.544	85.0	16.3	124.7	−3.9	27	0.657	71.7	197.8	106.6	−3.8
30	0.518	88.0	17.8	131.9	−3.9	32	0.676	69.4	195.9	101.7	−3.7

NOTATION.

k = the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

i = the angle between the Sun and Earth, as seen from the planet.

θ = the angle which the line joining the cusps, or extremities of the illuminated portion, makes with the meridian.

L = the brilliancy of the disk. The unit of L is the amount of light received by an eye from a circular disk with the same albedo as the planet, subtending an angular radius of one second of arc, situated at distance unity from the Sun, and illuminated by the latter as the mean disk of the planet is illuminated.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF MARS.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

FOR GREENWICH MEAN NOON.

Date.		Light-Time.	Stellar Magnitude.	P	$A_{\oplus}+180°$	$D_{\oplus}$	$A_{\odot}+180°$	$D_{\odot}$
		m		°	°	°	°	°
Jan.	1	34.87	−2.3	5.89	325.18	+1.75	325.01	+1.76
	8	34.94	2.2	5.46	324.23	1.75	325.60	1.74
	15	35.14	2.2	5.04	323.32	1.76	326.18	1.71
	22	35.47	2.2	4.66	322.47	1.76	326.77	1.68
	29	35.91	2.2	4.31	321.72	1.76	327.35	1.66
Feb.	5	36.46	−2.1	4.02	321.09	+1.75	327.93	+1.63
	12	37.10	2.1	3.80	320.60	1.75	328.52	1.60
	19	37.83	2.1	3.64	320.27	1.74	329.10	1.58
	26	38.62	2.0	3.56	320.09	1.74	329.68	1.55
Mar.	5	39.47	2.0	3.55	320.07	1.72	330.26	1.52
	12	40.37	−1.9	3.62	320.22	+1.71	330.84	+1.50
	19	41.28	1.9	3.76	320.52	1.69	331.42	1.47
	26	42.22	1.8	3.96	320.97	1.68	332.00	1.44
Apr.	2	43.16	1.8	4.24	321.55	1.66	332.58	1.41
	9	44.09	1.7	4.57	322.27	1.63	333.16	1.39
	16	45.00	−1.7	4.96	323.11	+1.61	333.73	+1.36
	23	45.88	1.6	5.39	324.06	1.58	334.31	1.33
	30	46.73	1.6	5.87	325.10	1.55	334.89	1.30
May	7	47.54	1.6	6.38	326.24	1.52	335.46	1.28
	14	48.29	1.5	6.93	327.45	1.48	336.04	1.25
	21	48.99	−1.5	7.50	328.74	+1.45	336.61	+1.22
	28	49.63	1.5	8.10	330.08	1.41	337.19	1.19
June	4	50.20	1.4	8.72	331.48	1.37	337.76	1.16
	11	50.70	1.4	9.34	332.92	1.32	338.33	1.13
	18	51.13	1.4	9.98	334.40	1.28	338.90	1.11
	25	51.48	−1.4	10.62	335.90	+1.23	339.48	+1.08
		....	..	....	.....	...	.....	...
		....	..	....	.....	...	.....	...
Aug.	28	50.94	−1.4	16.06	349.93	+0.71	344.68	+0.81
Sept.	4	50.48	1.4	16.56	351.36	0.65	345.25	0.78
	11	49.95	−1.4	17.04	352.74	+0.59	345.81	+0.75
	18	49.35	1.4	17.48	354.08	0.53	346.38	0.72
	25	48.68	1.5	17.89	355.35	0.47	346.94	0.69
Oct.	2	47.96	1.5	18.27	356.54	0.41	347.51	0.66
	9	47.18	1.6	18.61	357.66	0.35	348.07	0.64
	16	46.36	−1.6	18.92	358.68	+0.30	348.63	+0.61
	23	45.51	1.6	19.20	359.60	0.24	349.20	0.58
	30	44.62	1.7	19.43	0.41	0.19	349.76	0.55
Nov.	6	43.72	1.7	19.63	1.09	0.15	350.32	0.52
	13	42.81	1.8	19.79	1.64	0.10	350.88	0.49
	20	41.90	−1.8	19.90	2.05	+0.06	351.44	+0.46
	27	41.01	1.8	19.98	2.31	+0.03	352.00	0.43
Dec.	4	40.16	1.9	20.01	2.40	0.00	352.56	0.40
	11	39.34	1.9	19.99	2.34	−0.03	353.12	0.37
	18	38.59	2.0	19.93	2.12	0.05	353.68	0.34
	25	37.91	−2.0	19.83	1.74	−0.06	354.24	+0.31
	32	37.31	−2.0	19.69	1.22	−0.07	354.80	+0.28

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER.

FOR GREENWICH MEAN NOON.

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER, SYSTEM I.

GREENWICH MEAN TIME.

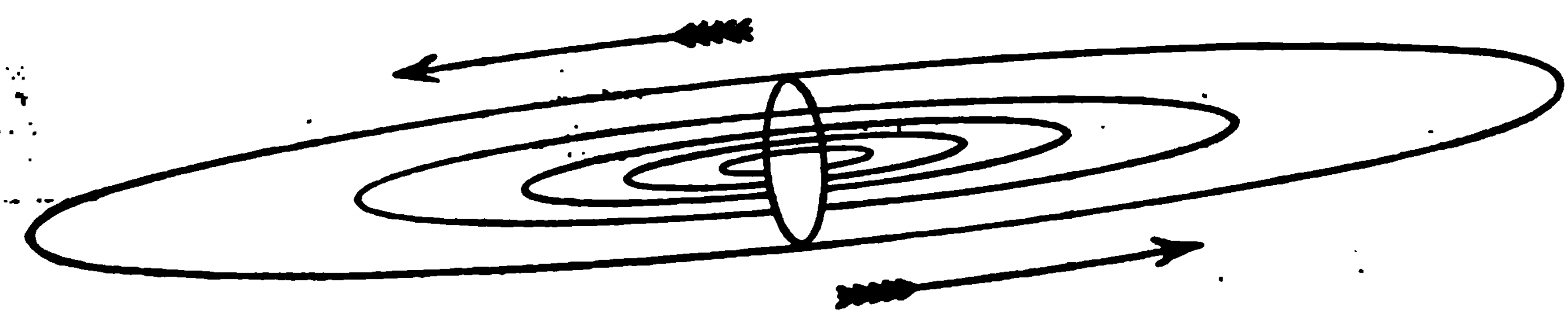
	Transit of Zero Meridian.	Interval between Successive Transits.		Transit of Zero Meridian.	Interval between Successive Transits.		Transit of Zero Meridian.	Interval between Successive Transits.
	d h m	h m		d h m	h m		d h m	h m
Jan.	1 9 33.13	9 50.41	Apr.	18 0 31.45	9 50.64	Sept.	19 15 43.54	9 50.5
	3 10 45.18			20 1 44.65			21 16 56.44	
	5 11 57.25			22 2 57.86			23 18 9.32	
	7 13 9.34			24 4 11.07			25 19 22.19	
	9 14 21.45			26 5 24.30			27 20 35.04	
	11 15 33.57	9 50.43		28 6 37.53	9 50.65		29 21 47.88	9 50.5
	13 16 45.72			30 7 50.78		Oct.	1 23 0.70	
	15 17 57.89		May	2 9 4.08			4 0 13.51	
	17 19 10.08			4 10 17.29			6 1 26.30	
	19 20 22.29			6 11 30.56			8 2 39.08	
	21 21 34.53	9 50.46		8 12 43.83	9 50.66		10 3 51.84	9 50.5
	23 22 46.79			10 13 57.11			12 5 4.58	
	25 23 59.06			12 15 10.39			14 6 17.31	
	28 1 11.40			14 16 23.68			16 7 30.02	
	30 2 23.74			16 17 36.97			18 8 42.71	
Feb.	1 3 36.11	9 50.48		18 18 50.27	9 50.66		20 9 55.39	9 50.5
	3 4 48.51			20 20 3.58			22 11 8.05	
	5 6 0.94			22 21 16.88			24 12 20.69	
	7 7 13.39			24 22 30.19			26 13 33.32	
	9 8 25.88			26 23 43.50			28 14 45.93	
	11 9 38.39	9 50.51		29 0 56.81	9 50.66		30 15 58.52	9 50.5
	13 10 50.93			31 2 10.13		Nov.	1 17 11.09	
	15 12 3.50		June	2 3 23.44			3 18 23.65	
	17 13 16.10			4 4 36.76			5 19 36.18	
	19 14 28.73			6 5 50.08			7 20 48.71	
	21 15 41.38	9 50.54		8 7 3.40	9 50.66		9 22 1.21	9 50.5
	23 16 54.05			10 8 16.72			11 23 13.70	
	25 18 6.76			12 9 30.03			14 0 26.17	
	27 19 19.49			14 10 43.35			16 1 38.62	
Mar.	1 20 32.25			16 11 56.67			18 2 51.05	
	3 21 45.03	9 50.56		18 13 9.98	9 50.66		20 4 3.47	9 50.4
	5 22 57.84			20 14 23.30			22 5 15.86	
	8 0 10.67			22 15 36.61			24 6 28.24	
	10 1 23.53			24 16 49.91			26 7 40.60	
	12 2 36.41			26 18 3.22			28 8 52.94	
	14 3 49.31	9 50.59		28 19 16.53	9 50.66		30 10 5.27	9 50.4
	16 5 2.23			30 20 29.83		Dec.	2 11 17.58	
	18 6 15.18		July	2 21 43.12			4 12 29.87	
	20 7 28.15			4 22 56.42			6 13 42.14	
	22 8 41.13			. . . .			8 14 54.40	
	24 9 54.14	9 50.61		. . . .			10 16 6.64	9 50.4
	26 11 7.16		Aug.	28 2 20.75	9 50.61		12 17 18.86	
	28 12 20.20			30 3 33.80			14 18 31.07	
	30 13 33.26		Sept.	1 4 46.83			16 19 43.26	
Apr.	1 14 46.33			3 5 59.85			18 20 55.44	
	3 15 59.42	9 50.62		5 7 12.86	9 50.60		20 22 7.60	9 50.4
	5 17 12.53			7 8 25.86			22 23 19.74	
	7 18 25.65			9 9 38.84			25 0 31.88	
	9 19 38.78			11 10 51.81			27 1 44.00	
	11 20 51.93			13 12 4.76			29 2 56.11	
	13 22 5.10	9 50.64		15 13 17.70	9 50.58		31 4 8.20	9 50.4
	15 23 18.27			17 14 30.63			33 5 20.29	

EPHEMERIS FOR PHYSICAL OBSERVATIONS OF JUPITER, SYSTEM II.

GREENWICH MEAN TIME.

	Transit of Zero Meridian.	Interval between Successive Transits.		Transit of Zero Meridian.	Interval between Successive Transits.		Transit of Zero Meridian.	Interval between Successive Transits.
	d h m	h m		d h m	h m		d h m	h m
Jan.	1 9 54.72	9 55.59	Apr.	18 23 19.41	9 55.82	Sept.	19 21 25.06	9 55.76
	3 11 32.65			21 0 58.50			21 23 3.84	
	5 13 10.60			23 2 37.61			24 0 42.62	
	7 14 48.57			25 4 16.73			26 2 21.38	
	9 16 26.55			27 5 55.86			28 4 0.12	
	11 18 4.56	9 55.61		29 7 35.00	9 55.83		30 5 38.85	9 55.74
	13 19 42.58		May	1 9 14.14		Oct.	2 7 17.56	
	15 21 20.63			3 10 53.29			4 8 56.26	
	17 22 58.70			5 12 32.45			6 10 34.94	
	20 0 36.80			7 14 11.62			8 12 13.61	
	22 2 14.92	9 55.64		9 15 50.79	9 55.84		10 13 52.26	9 55.72
	24 3 53.07			11 17 29.97			12 15 30.80	
	26 5 31.24			13 19 9.16			14 17 9.51	
	28 7 9.44			15 20 48.35			16 18 48.10	
	30 8 47.67			17 22 27.54			18 20 26.69	
Feb.	1 10 25.93	9 55.66		20 0 6.74	9 55.84		20 22 5.25	9 55.71
	3 12 4.21			22 1 45.94			22 23 43.80	
	5 13 42.52			24 3 25.15			25 1 22.32	
	7 15 20.87			26 5 4.36			27 3 0.84	
	9 16 59.24			28 6 43.57			29 4 39.33	
	11 18 37.64	9 55.69		30 8 22.78	9 55.84		31 6 17.80	9 55.69
	13 20 16.08		June	1 10 1.99		Nov.	2 7 56.26	
	15 21 54.54			3 11 41.21			4 9 34.70	
	17 23 33.02			5 13 20.42			6 11 13.12	
	20 1 11.54			7 14 59.64			8 12 51.53	
	22 2 50.08	9 55.72		9 16 38.86	9 55.84		10 14 29.91	9 55.67
	24 4 28.65			11 18 18.07			12 16 8.28	
	26 6 7.25			13 19 57.29			14 17 46.63	
	28 7 45.88			15 21 36.51			16 19 24.96	
Mar.	2 9 24.53			17 23 15.72			18 21 3.28	
	4 11 3.21	9 55.75		20 0 54.93	9 55.84		20 22 41.57	9 55.65
	6 12 41.91			22 2 34.15			23 0 19.85	
	8 14 20.64			24 4 13.36			25 1 58.10	
	10 15 59.40			26 5 52.56			27 3 36.34	
	12 17 38.17			28 7 31.77			29 5 14.56	
	14 19 16.97	9 55.77		30 9 10.97	9 55.84	Dec.	1 6 52.77	9 55.63
	16 20 55.80		July	2 10 50.17			3 8 30.95	
	18 22 34.64			4 12 29.36			5 10 9.12	
	21 0 13.50			6 14 8.56			7 11 47.27	
	23 1 52.39			. . . .			9 13 25.40	
	25 3 31.29	9 55.79		. . . .			11 15 3.52	9 55.62
	27 5 10.21		Aug.	28 3 17.42	9 55.79		13 16 41.62	
	29 6 49.15			30 4 56.36			15 18 19.70	
	31 8 28.11		Sept.	1 6 35.30			17 19 57.77	
Apr.	2 10 7.08			3 8 14.21			19 21 35.82	
	4 11 46.07	9 55.81		5 9 53.12	9 55.77		21 23 13.85	9 55.60
	6 13 25.08			7 11 32.01			24 0 51.87	
	8 15 4.10			9 13 10.88			26 2 29.88	
	10 16 43.14			11 14 49.75			28 4 7.87	
	12 18 22.19			13 16 28.60			30 5 45.85	
	14 20 1.25	9 55.82		15 18 7.43	9 55.76		32 7 23.82	9 55.5
	16 21 40.32			17 19 46.25			34 9 1.78	

South



North

APPARENT ORBITS OF THE SATELLITES OF JUPITER AT DATE OF OPPOSITION, JANUARY 1, 1919, AS SEEN IN AN INVERTING TELESCOPE, AND ELONGATED IN THE RATIO OF THREE TO ONE IN THE DIRECTION OF THEIR MINOR AXES.

In the above diagram the central ellipse represents the disk of Jupiter, and the inner orbit is that of Satellite V.

In the diagrams of the configurations of Jupiter's four brighter satellites, pages 631–651, Jupiter is represented by a light disk, ○, in the center of the page, and the relative positions of the satellites at the Greenwich time stated above the diagrams are indicated by dots. The designation of each satellite is shown by a numeral placed to the right or left of the dot, according as the motion of the satellite at the instant in question is toward the east or toward the west, the motion being always toward the numeral. In constructing the diagrams the latitudes of the satellites are always considered zero, except where two or more of them chance to be at nearly the same distance from the planet, when they are placed one above the other, according to their apparent latitudes. If, at the epoch of any configuration, one or more satellites are projected on the disk of the planet, that phenomenon is indicated by a light disk, ○, at the left-hand side of the page; and if any satellites are invisible on account of being occulted behind the disk of the planet, or eclipsed by its shadow, that circumstance is indicated by a dark disk, ●, at the right-hand side of the page. In both cases the annexed numerals serve to point out which satellites are thus rendered invisible.

MEAN SYNODIC PERIODS OF THE SATELLITES.

	d h m s	d		d h m s	d
I.	1 18 28 35.946	= 1.769 860 49	V.	0 11 57 27.635	= 0.498 236 52
II.	3 13 17 53.736	= 3.554 094 17	VI.		=266.00
III.	7 3 59 35.856	= 7.166 387 22	VII.		=276.67
IV.	16 18 5 6.916	=16.753 552 27			

SATELLITE V.

GREENWICH MEAN TIME OF EVERY TWENTIETH GREATEST ELONGATION.

	d	h			d	h			d	h			d	h	
Jan.	1	20.6	E.	Apr.	1	12.7	E.	Jan.	1	14.6	W.	Apr.	1	6.7	W.
	11	19.7	E.		..	...			11	13.7	W.		..	...	
	21	18.7	E.	Nov.	1	19.2	E.		21	12.8	W.	Nov.	1	13.3	W.
	31	17.8	E.		11	18.4	E.		31	11.9	W.		11	12.4	W.
Feb.	10	17.0	E.		21	17.5	E.	Feb.	10	11.0	W.		21	11.5	W.
	20	16.1	E.	Dec.	1	16.6	E.		20	10.1	W.	Dec.	1	10.6	W.
Mar.	2	15.2	E.		11	15.7	E.	Mar.	2	9.2	W.		11	9.7	W.
	12	14.4	E.		21	14.8	E.		12	8.4	W.		21	8.8	W.
	22	13.5	E.		31	13.9	E.		22	7.6	W.		31	7.9	W.

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE I.

	d	h	m		d	h	m		d	h	m		d	h	m
an.	1	3	27.2	Mar.	23	12	13.9	June	12	23	1.9	Oct.	13	3	31.4
	2	21	53.2		25	6	42.7		14	17	32.2		14	22	0.5
	4	16	19.1		27	1	11.5		16	12	2.5		16	16	29.5
	6	10	45.0		28	19	40.4		18	6	32.9		18	10	58.5
	8	5	10.9		30	14	9.3		20	1	3.2		20	5	27.4
	9	23	37.0	Apr.	1	8	38.4		21	19	33.5		21	23	56.2
	11	18	3.0		3	3	7.3		23	14	3.9		23	18	25.0
	13	12	29.0		4	21	36.5		25	8	34.2		25	12	53.8
	15	6	55.1		6	16	5.6		..	...	...		27	7	22.5
	17	1	21.2		8	10	34.9		..	...	...		29	1	51.1
	18	19	47.4		10	5	4.1		..	...	...		30	20	19.7
	20	14	13.6		11	23	33.5		..	...	...	Nov.	1	14	48.3
	22	8	39.8		13	18	2.8	Aug.	13	22	42.2		3	9	16.8
	24	3	6.2		15	12	32.3		15	17	12.3		5	3	45.2
	25	21	32.5		17	7	1.7		17	11	42.4		6	22	13.6
	27	15	59.0		19	1	31.3		19	6	12.5		8	16	41.9
	29	10	25.4		20	20	0.8		21	0	42.5		10	11	10.1
	31	4	52.0		22	14	30.5		22	19	12.6		12	5	38.3
eb.	1	23	18.6		24	9	0.1		24	13	42.6		14	0	6.4
	3	17	45.3		26	3	29.8		26	8	12.6		15	18	34.5
	5	12	12.0		27	21	59.5		28	2	42.6		17	13	2.5
	7	6	38.9		29	16	29.3		29	21	12.5		19	7	30.5
	9	1	5.7	May	1	10	59.0		31	15	42.5		21	1	58.3
	10	19	32.7		3	5	28.9	Sept.	2	10	12.3		22	20	26.1
	12	13	59.7		4	23	58.7		4	4	42.2		24	14	53.9
	14	8	26.9		6	18	28.7		5	23	12.1		26	9	21.5
	16	2	54.1		8	12	58.6		7	17	41.9		28	3	49.1
	17	21	21.4		10	7	28.6		9	12	11.7		29	22	16.7
	19	15	48.7		12	1	58.5		11	6	41.5	Dec.	1	16	44.1
	21	10	16.1		13	20	28.6		13	1	11.2		3	11	11.6
	23	4	43.6		15	14	58.6		14	19	40.9		5	5	38.9
	24	23	11.2		17	9	28.7		16	14	10.6		7	0	6.2
	26	17	38.8		19	3	58.8		18	8	40.2		8	18	33.3
	28	12	6.6		20	22	28.9		20	3	9.9		10	13	0.5
lar.	2	6	34.4		22	16	59.0		21	21	39.4		12	7	27.5
	4	1	2.3		24	11	29.2		23	16	8.9		14	1	54.5
	5	19	30.2		26	5	59.3		25	10	38.5		15	20	21.4
	7	13	58.3		28	0	29.6		27	5	8.0		17	14	48.3
	9	8	26.4		29	18	59.7		28	23	37.4		19	9	15.1
	11	2	54.7		31	13	30.0		30	18	6.8		21	3	41.9
	12	21	22.8	June	2	8	0.2	Oct.	2	12	36.1		22	22	8.5
	14	15	51.2		4	2	30.5		4	7	5.5		24	16	35.2
	16	10	19.6		5	21	0.7		6	1	34.7		26	11	1.7
	18	4	48.2		7	15	31.0		7	20	4.0		28	5	28.2
	19	23	16.6		9	10	1.3		9	14	33.1		29	23	54.8
	21	17	45.3		11	4	31.6		11	9	2.3		31	18	21.1

GREENWICH MEAN TIME OF SUPERIOR GEOCENTRIC CONJUNCTION.

SATELLITE II.

	d	h m		d	h m		d	h m		d	h m
Jan.	0	1 13.0	Mar.	22	16 16.6	June	12	11 26.3	Oct.	15	0 43.1
	3	14 19.4		26	5 33.5		16	0 51.2		18	14 4.5
	7	3 26.0		29	18 51.0		19	14 16.0		22	3 24.7
	10	16 32.6	Apr.	2	8 9.0		23	3 40.7		25	16 45.1
	14	5 39.4		5	21 27.5		26	17 5.9		29	6 4.3
	17	18 46.5		9	10 46.4			. . . . .	Nov.	1	19 23.9
	21	7 53.9		13	0 5.8	Aug.	15	13 1.1		5	8 42.2
	24	21 1.6		16	13 25.6		19	2 25.9		8	22 0.7
	28	10 9.8		20	2 45.8		22	15 51.4		12	11 17.9
	31	23 18.3		23	16 6.4		26	5 16.0		16	0 35.2
Feb.	4	12 27.3		27	5 27.4		29	18 41.3		19	13 51.3
	8	1 36.9		30	18 48.7	Sept.	2	8 5.5		23	3 7.5
	11	14 47.1	May	4	8 10.4		5	21 30.5		26	16 22.5
	15	3 57.7		7	21 32.4		9	10 54.4		30	5 37.4
	18	17 9.0		11	10 54.7		13	0 19.0	Dec.	3	18 51.1
	22	6 20.8		15	0 17.3		16	13 42.4		7	8 4.9
	25	19 33.3		18	13 40.1		20	3 6.5		10	21 17.5
Mar.	1	8 46.2		22	3 3.3		23	16 29.4		14	10 29.9
	4	21 59.8		25	16 26.6		27	5 53.0		17	23 41.3
	8	11 14.0		29	5 50.3		30	19 15.3		21	12 52.6
	12	0 28.8	June	1	19 14.0	Oct.	4	8 38.3		25	2 2.8
	15	13 44.2		5	8 38.1		7	22 0.0		28	15 13.0
	19	3 0.1		8	22 2.2		11	11 22.1		32	4 22.3

SATELLITE III.

	d	h m		d	h m		d	h m		d	h m
Jan.	6	17 41.0	Apr.	2	13 2.5		. .	. . . . .	Oct.	13	10 44.2
	13	20 56.6		9	17 7.7		. .	. . . . .		20	14 54.4
	21	0 14.2		16	21 16.2		. .	. . . . .		27	19 0.6
	28	3 35.1		24	1 27.5		. .	. . . . .	Nov.	3	23 2.8
Feb.	4	6 59.8	May	1	5 41.8	Aug.	17	0 3.0		11	3 1.1
	11	10 29.2		8	9 59.2		24	4 29.0		18	6 55.3
	18	14 2.5		15	14 19.0		31	8 54.4		25	10 45.9
	25	17 40.5		22	18 41.2	Sept.	7	13 17.6	Dec.	2	14 31.6
Mar.	4	21 23.1		29	23 4.4		14	17 38.9		9	18 12.9
	12	1 10.5	June	6	3 28.8		21	21 58.2		16	21 48.8
	19	5 3.3		13	7 54.1		29	2 15.6		24	1 19.8
	26	9 0.5		20	12 20.3	Oct.	6	6 31.3		31	4 46.4

SATELLITE IV.

	d	h m		d	h m		d	h m		d	h m
Jan.	14	1 17.5	Apr.	7	10 36.6		. .	. . . . .	Oct.	26	11 52.0
	30	15 43.5		24	5 35.7	Aug.	20	4 35.3	Nov.	12	6 8.7
Feb.	16	6 56.8	May	11	1 12.5	Sept.	6	1 2.3		28	23 29.9
Mar.	4	23 10.4		27	21 17.9		22	21 10.4	Dec.	15	15 50.5
	21	16 25.5	June	13	17 44.2	Oct.	9	16 49.6		32	7 12.5

DIFFERENTIAL COORDINATES OF SATELLITE VI.

FOR GREENWICH MEAN NOON.

Date.	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$	Date.	$\alpha_{VI}-\alpha_{Jup.}$	$\delta_{VI}-\delta_{Jup.}$
	m s	′		m s	′		m s	′
. 1	−1 34	−32.7	Apr. 11	+3 18	+11.4	Sept. 27	−1 49	−15.4
5	1 9	32.6	15	3 7	12.9	Oct. 1	1 39	15.1
9	0 44	32.3	19	2 55	14.2	5	1 28	14.7
13	−0 20	31.7	23	2 41	15.2	9	1 16	14.2
17	+0 5	30.8	27	2 26	16.1	13	1 3	13.7
21	+0 30	−29.7	May 1	+2 9	+16.7	17	−0 50	−13.1
25	0 53	28.3	5	1 51	17.1	21	0 36	12.5
29	1 16	26.7	9	1 32	17.2	25	0 21	11.8
b. 2	1 38	24.9	13	1 12	17.0	29	−0 6	11.0
6	1 58	23.0	17	0 51	16.6	Nov. 2	+0 10	10.2
10	+2 16	−20.9	21	+0 30	+16.0	6	+0 26	− 9.3
14	2 33	18.7	25	+0 9	15.1	10	0 42	8.4
18	2 49	16.5	29	−0 12	14.0	14	0 59	7.4
22	3 2	14.1	June 2	0 32	12.7	18	1 16	6.4
26	3 14	11.8	6	0 51	11.3	22	1 33	5.3
r. 2	+3 24	− 9.4	10	−1 10	+ 9.6	26	+1 50	− 4.2
6	3 32	7.0	14	−1 27	+ 8.0	30	2 7	3.0
10	3 37	4.7		. ..	. . .	Dec. 4	2 23	1.8
14	3 41	2.4	Aug. 30	−2 44	−15.1	8	2 38	− 0.5
18	3 44	− 0.2	Sept. 3	2 39	15.4	12	2 52	+ 0.9
22	+3 44	+ 2.0	7	−2 32	−15.6	16	+3 5	+ 2.3
26	3 42	4.1	11	2 25	15.8	20	3 17	3.7
30	3 39	6.1	15	2 17	15.8	24	3 26	5.1
r. 3	3 34	8.0	19	2 9	15.7	28	3 32	6.5
7	+3 26	+ 9.8	23	−1 59	−15.6	32	+3 36	+ 7.9

DIFFERENTIAL COORDINATES OF SATELLITE VII.

Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$	Date.	$\alpha_{VII}-\alpha_{Jup.}$	$\delta_{VII}-\delta_{Jup.}$
	m s	′		m s	′		m s	′
. 1	+2 5	+17.2	Apr. 11	−3 51	+22.8	Sept. 27	+2 39	+ 8.3
5	1 44	19.9	15	3 49	21.3	Oct. 1	2 34	10.0
9	1 21	22.3	19	3 46	19.8	5	2 28	11.7
13	0 58	24.6	23	3 42	18.1	9	2 21	13.5
17	0 34	26.7	27	3 37	16.3	13	2 14	15.2
21	+0 10	+28.6	May 1	−3 31	+14.5	17	+2 6	+17.0
25	−0 14	30.3	5	3 24	12.6	21	1 57	18.8
29	0 38	31.7	9	3 16	10.5	25	1 47	20.6
). 2	1 1	32.9	13	3 7	8.4	29	1 36	22.3
6	1 23	33.8	17	2 57	6.3	Nov. 2	1 24	24.0
10	−1 44	+34.5	21	−2 45	+ 4.1	6	+1 11	+25.6
14	2 4	35.0	25	2 32	+ 1.8	10	0 58	27.2
18	2 22	35.1	29	2 19	− 0.4	14	0 43	28.6
22	2 38	35.1	June 2	2 4	2.6	18	0 28	29.9
26	2 53	34.8	6	1 48	4.7	22	+0 12	31.1
r. 2	−3 6	+34.2	10	−1 30	− 6.8	26	−0 5	+32.1
6	3 17	33.6	14	−1 13	− 8.7	30	0 22	33.0
10	3 26	32.7		. ..	. . .	Dec. 4	0 39	33.8
14	3 34	31.8	Aug. 30	+2 53	− 3.6	8	0 57	34.4
18	3 40	30.7	Sept. 3	2 54	1.8	12	1 15	34.9
22	−3 45	+29.5	7	+2 53	− 0.1	16	−1 32	+35.2
26	3 49	28.3	11	2 52	+ 1.6	20	1 50	35.3
30	3 51	27.0	15	2 50	3.3	24	2 7	35.2
r. 3	3 52	25.7	19	2 47	5.0	28	2 24	35.0
7	−3 52	+24.3	23	+2 43	+ 6.7	32	−2 41	+34.5

GREENWICH MEAN TIME.

JANUARY.

d	h	m	
1	2	18.3	I. Ec. D.
	4	35	I. Oc. R.
	18	5	II.*Tr. I.
	18	5	II.*Sh. I.
	20	47	II.*Tr. E.
	20	48	II.*Sh. E.
	23	37	I.*Tr. I.
	23	38	I.*Sh. I.
2	1	52	I. Tr. E.
	1	53	I. Sh. E.
	20	45	I.*Oc. D.
	23	2.9	I.*Ec. R.
3	2	41	III. Tr. I.
	2	50	III. Sh. I.
	5	51	III. Tr. E.
	6	1	III. Sh. E.
	12	59	II.*Oc. D.
	15	45.7	II.*Ec. R.
	18	3	I.*Tr. I.
	18	6	I.*Sh. I.
	20	18	I.*Tr. E.
	20	21	I.*Sh. E.
4	15	11	I.*Oc. D.
	17	31.6	I.*Ec. R.
5	7	12	II. Tr. I.
	7	23	II. Sh. I.
	9	54	II. Tr. E.
	10	6	II. Sh. E.
	12	29	I.*Tr. I.
	12	35	I.*Sh. I.
	14	44	I.*Tr. E.
	14	50	I.*Sh. E.
	17	37	IV.*Tr. I.
	18	34	IV.*Sh. I.
	19	49	IV.*Tr. E.
	20	49	IV.*Sh. E.
6	9	37	I. Oc. D.
	12	0.3	I.*Ec. R.
	16	6	III.*Oc. D.
	19	48.6	III.*Ec. R.
7	2	6	II. Oc. D.
	5	3.1	II. Ec. R.
	6	55	I. Tr. I.
	7	3	I. Sh. I.
	9	10	I. Tr. E.
	9	18	I. Sh. E.
8	4	3	I. Oc. D.
	6	29.0	I. Ec. R.
	20	20	II.*Tr. I.
	20	42	II.*Sh. I.
	23	2	II.*Tr. E.
	23	25	II.*Sh. E.
9	1	21	I. Tr. I.
9	1	32	I. Sh. I.
	3	36	I. Tr. E.
	3	47	I. Sh. E.
	22	29	I.*Oc. D.
10	0	57.8	I. Ec. R.
	5	56	III. Tr. I.
	6	49	III. Sh. I.
	9	6	III. Tr. E.
	10	1	III. Sh. E.
	15	12	II.*Oc. D.
	18	20.5	II.*Ec. R.
	19	47	I.*Tr. I.
	20	1	I.*Sh. I.
	22	1	I.*Tr. E.
	22	16	I.*Sh. E.
11	16	55	I.*Oc. D.
	19	26.5	I.*Ec. R.
12	9	27	II. Tr. I.
	10	0	II. Sh. I.
	12	9	II.*Tr. E.
	12	43	II.*Sh. E.
	14	13	I.*Tr. I.
	14	29	I.*Sh. I.
	16	27	I.*Tr. E.
	16	44	I.*Sh. E.
13	11	21	I.*Oc. D.
	13	55.2	I.*Ec. R.
	19	21	III.*Oc. D.
	23	48.6	III. Ec. R.
14	0	12	IV. Oc. D.
	2	23	IV. Oc. R.
	3	8.6	IV. Ec. D.
	4	19	II. Oc. D.
	5	29.0	IV. Ec. R.
	7	37.9	II. Ec. R.
	8	39	I. Tr. I.
	8	58	I. Sh. I.
	10	53	I.*Tr. E.
	11	13	I.*Sh. E.
15	5	47	I. Oc. D.
	8	23.9	I. Ec. R.
	22	35	II.*Tr. I.
	23	19	II. Sh. I.
16	1	18	II. Tr. E.
	2	3	II. Sh. E.
	3	5	I. Tr. I.
	3	26	I. Sh. I.
	5	19	I. Tr. E.
	5	41	I. Sh. E.
17	0	13	I. Oc. D.
	2	52.7	I. Ec. R.
	9	14	III. Tr. I.
	10	49	III.*Sh. I.
17	12	23	III.*Tr. E.
	14	1	III.*Sh. E.
	17	26	II.*Oc. D.
	20	55.3	II.*Ec. R.
	21	31	I.*Tr. I.
	21	55	I.*Sh. I.
	23	45	I. Tr. E.
18	0	10	I. Sh. E.
	18	39	I.*Oc. D.
	21	21.5	I.*Ec. R.
19	11	43	II.*Tr. I.
	12	38	II.*Sh. I.
	14	26	II.*Tr. E.
	15	21	II.*Sh. E.
	15	57	I.*Tr. I.
	16	24	I.*Sh. I.
	18	11	I.*Tr. E.
	18	38	I.*Sh. E.
20	13	6	I.*Oc. D.
	15	50.3	I.*Ec. R.
	22	39	III.*Oc. D.
21	3	48.9	III. Ec. R.
	6	33	II. Oc. D.
	10	12.8	II. Ec. R.
	10	23	I. Tr. I.
	10	52	I.*Sh. I.
	12	38	I.*Tr. E.
	13	7	I.*Sh. E.
22	7	32	I. Oc. D.
	7	51	IV. Tr. I.
	10	4	IV. Tr. E.
	10	19.0	I. Ec. R.
	12	32	IV.*Sh. I.
	15	1	IV.*Sh. E.
23	0	52	II. Tr. I.
	1	57	II. Sh. I.
	3	35	II. Tr. E.
	4	40	II. Sh. E.
	4	49	I. Tr. I.
	5	21	I. Sh. I.
	7	4	I. Tr. E.
	7	36	I. Sh. E.
24	1	58	I. Oc. D.
	4	47.9	I. Ec. R.
	12	33	III.*Tr. I.
	14	48	III.*Sh. I.
	15	42	III.*Tr. E.
	18	2	III.*Sh. E.
	19	41	II.*Oc. D.
	23	16	I. Tr. I.
	23	30.2	II. Ec. R.
	23	49	I. Sh. I.
25	1	30	I. Tr. E.
25	2	4	I. Sh. E.
	20	25	I.*Oc. D.
	23	16.6	I. Ec. R.
26	14	1	II.*Tr. I.
	15	15	II.*Sh. I.
	16	43	II.*Tr. E.
	17	42	I.*Tr. I.
	17	58	II.*Sh. E.
	18	18	I.*Sh. I.
	19	56	I.*Tr. E.
	20	33	I.*Sh. E.
27	14	51	I.*Oc. D.
	17	45.5	I.*Ec. R.
28	2	0	III. Oc. D.
	7	49.9	III. Ec. R.
	8	49	II. Oc. D.
	12	8	I.*Tr. I.
	12	47	I.*Sh. I.
	12	47.7	II.*Ec. R.
	14	23	I.*Tr. E.
	15	1	I.*Sh. E.
29	9	17	I. Oc. D.
	12	14.2	I.*Ec. R.
30	3	11	II. Tr. I.
	4	34	II. Sh. I.
	5	53	II. Tr. E.
	6	35	I. Tr. I.
	7	15	I. Sh. I.
	7	18	II. Sh. E.
	8	49	I. Tr. E.
	9	30	I. Sh. E.
	14	37	IV.*Oc. D.
	16	50	IV.*Oc. R.
	21	9.3	IV.*Ec. D.
	23	43.6	IV. Ec. R.
31	3	44	I. Oc. D.
	6	43.1	I. Ec. R.
	15	55	III.*Tr. I.
	18	48	III.*Sh. I.
	19	5	III.*Tr. E
	21	58	II. Oc. D.
	22	2	III. Sh. E.

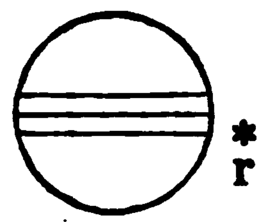
Note.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

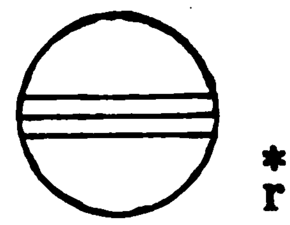
JANUARY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

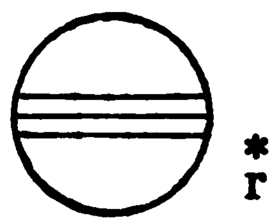
I.



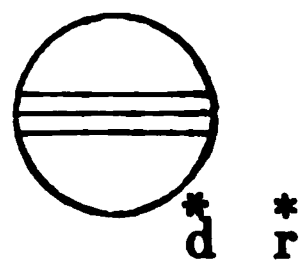
III.



II.



IV.



Configurations at 16^h 15^m for an Inverting Telescope.

Day.	West.		East.
1		O	2· 1· 3· 4·
2	2· ·1	O	3· 4·
3	3·	O	1· ·2 4·
4	3·	O	2·4· ·1 ●
5	·3 2· 1·	O	4·
6	4· ·2	O	·1 ·3 ●
7	4· 1·	O	·2 ·3
8	4·	O	2· 1· 3·
9	4· 2· ·1	O	3·
10	·4 3·	O	1· ·2 ●
11	·4 3· ·	O	1 2·
12	O 1· ·3 ·4 2·	O	
13	·2 ·4 ·3	O	·1
14	1·	O	·4 ·2 ·3
15		O	2· ·1 3· ·4
16	2· ·1	O	3· ·4
17	3· ·	O	2 1· ·4
18	3· ·1	O	2· 4·
19	O 1· ·3 2·	O	4·
20	·2 ·3	O	·1 4·
21	1·	O	4· ·2 ·3
22	4·	O	2· ·1 ·3
23	4· 2· 1·	O	3·
24	4· 3· ·2	O	1·
25	4· 3· ·1	O	·2
26	O 2· ·4 ·3	O	1·
27	·4 ·2 ·3	O	·1 ●
28	·4 1·	O	·2 ·3
29	·4	O	·12· ·3
30	2·1·	O	3· ·4 ●
31	O 3· ·2	O	1· ·4

GREENWICH MEAN TIME.

FEBRUARY.

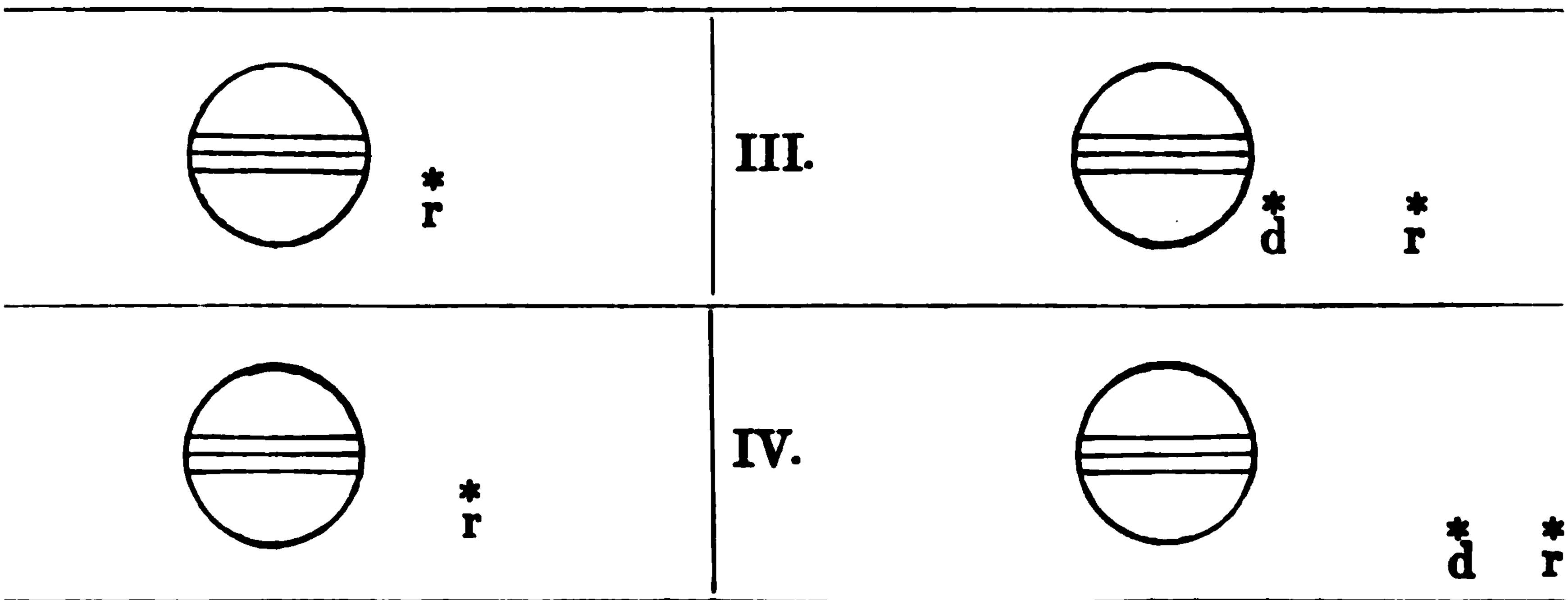
d	h	m	
1	1	1	I. Tr. I.
	1	44	I. Sh. I.
	2	5.2	II. Ec. R.
	3	15	I. Tr. E.
	3	59	I. Sh. E.
	22	11	I. Oc. D.
2	1	11.9	I. Ec. R.
	16	20	II.*Tr. I.
	17	53	II.*Sh. I.
	19	2	II.*Tr. E.
	19	28	I.*Tr. I.
	20	13	I.*Sh. I.
	20	36	II.*Sh. E.
	21	42	I.*Tr. E.
	22	27	I. Sh. E.
3	16	37	I.*Oc. D.
	19	40.8	I.*Ec. R.
4	5	24	III. Oc. D.
	11	7	II.*Oc. D.
	11	50.9	III.*Ec. R.
	13	54	I.*Tr. I.
	14	41	I.*Sh. I.
	15	22.7	II.*Ec. R.
	16	9	I.*Tr. E.
	16	56	I.*Sh. E.
5	11	4	I.*Oc. D.
	14	9.6	I.*Ec. R.
6	5	31	II. Tr. I.
	7	12	II. Sh. I.
	8	13	II. Tr. E.
	8	21	I. Tr. I.
	9	10	I. Sh. I.
	9	56	II. Sh. E.
	10	35	I. Tr. E.
	11	25	I.*Sh. E.
7	5	31	I. Oc. D.
	8	38.5	I. Ec. R.
	19	22	III.*Tr. I.
	22	31	III. Tr. E.
	22	41	IV. Tr. I.
	22	47	III. Sh. I.
8	0	16	II. Oc. D.
	0	57	IV. Tr. E.
	2	2	III. Sh. E.
	2	48	I. Tr. I.
	3	39	I. Sh. I.
	4	40.2	II. Ec. R.
	5	2	I. Tr. E.
	5	53	I. Sh. E.
	6	31	IV. Sh. I.
	9	12	IV. Sh. E.
	23	58	I. Oc. D.
9	3	7.3	I. Ec. R.
9	18	42	II.*Tr. I.
	20	30	II.*Sh. I.
	21	15	I. Tr. I.
	21	24	II. Tr. E.
	22	7	I. Sh. I.
	23	14	II. Sh. E.
	23	29	I. Tr. E.
10	0	22	I. Sh. E.
	18	25	I.*Oc. D.
	21	36.2	I. Ec. R.
11	8	54	III. Oc. D.
	12	5	III.*Oc. R.
	12	35.6	III.*Ec. D.
	13	27	II.*Oc. D.
	15	42	I.*Tr. I.
	15	52.6	III.*Ec. R.
	16	36	I.*Sh. I.
	17	56	I.*Tr. E.
	17	57.8	II.*Ec. R.
	18	51	I.*Sh. E.
12	12	52	I.*Oc. D.
	16	5.0	I.*Ec. R.
13	7	54	II. Tr. I.
	9	50	II. Sh. I.
	10	9	I. Tr. I.
	10	36	II. Tr. E.
	11	5	I. Sh. I.
	12	23	I.*Tr. E.
	12	34	II.*Sh. E.
	13	19	I.*Sh. E.
14	7	19	I. Oc. D.
	10	33.9	I. Ec. R.
	22	52	III. Tr. I.
15	2	1	III. Tr. E.
	2	37	II. Oc. D.
	2	46	III. Sh. I.
	4	36	I. Tr. I.
	5	33	I. Sh. I.
	6	2	III. Sh. E.
	6	50	I. Tr. E.
	7	15.3	II. Ec. R.
	7	48	I. Sh. E.
16	1	46	I. Oc. D.
	5	2.8	I. Ec. R.
	5	48	IV. Oc. D.
	8	6	IV. Oc. R.
	15	11.0	IV.*Ec. D.
	17	57.8	IV.*Ec. R.
	21	6	II. Tr. I.
	23	3	I. Tr. I.
	23	8	II. Sh. I.
	23	48	II. Tr. E.
17	0	2	I. Sh. I.
17	1	17	I. Tr. E.
	1	52	II. Sh. E.
	2	17	I. Sh. E.
	20	13	I.*Oc. D.
	23	31.7	I. Ec. R.
18	12	27	III.*Oc. D.
	15	38	III.*Oc. R.
	15	48	II.*Oc. D.
	16	35.8	III.*Ec. D.
	17	30	I.*Tr. I.
	18	31	I.*Sh. I.
	19	44	I.*Tr. E.
	19	53.7	III.*Ec. R.
	20	32.9	II.*Ec. R.
	20	45	I. Sh. E.
19	14	41	I.*Oc. D.
	18	0.5	I.*Ec. R.
20	10	19	II. Tr. I.
	11	57	I.*Tr. I.
	12	28	II.*Sh. I.
	12	59	I.*Sh. I.
	13	1	II.*Tr. E.
	14	11	I.*Tr. E.
	15	12	II.*Sh. E.
	15	14	I.*Sh. E.
21	9	8	I. Oc. D.
	12	29.5	I.*Ec. R.
22	2	28	III. Tr. I.
	5	0	II. Oc. D.
	5	37	III. Tr. E.
	6	25	I. Tr. I.
	6	46	III. Sh. I.
	7	28	I. Sh. I.
	8	38	I. Tr. E.
	9	43	I. Sh. E.
	9	50.4	II. Ec. R.
	10	2	III. Sh. E.
23	3	36	I. Oc. D.
	6	58.3	I. Ec. R.
	23	32	II. Tr. I.
24	0	52	I. Tr. I.
	1	46	II. Sh. I.
	1	57	I. Sh. I.
	2	14	II. Tr. E.
	3	6	I. Tr. E.
	4	11	I. Sh. E.
	4	30	II. Sh. E.
	14	22	IV.*Tr. I.
	16	44	IV.*Tr. E.
	22	3	I. Oc. D.
25	0	31	IV. Sh. I.
	1	27.3	I. Ec. R.
	3	23	IV. Sh. E.
25	16	5	III.*Oc. D.
	18	13	II.*Oc. D.
	19	16	III.*Oc. R.
	19	19	I.*Tr. I.
	20	26	I. Sh. I.
	20	35.8	III. Ec. D.
	21	33	I. Tr. E.
	22	40	I. Sh. E.
	23	8.1	II. Ec. R.
	23	54.5	III. Ec. R.
26	16	31	I.*Oc. D.
	19	56.1	I.*Ec. R.
27	12	47	II.*Tr. I.
	13	47	I.*Tr. I.
	14	54	I.*Sh. I.
	15	6	II.*Sh. I.
	15	29	II.*Tr. E.
	16	1	I.*Tr. E.
	17	9	I.*Sh. E.
	17	50	II.*Sh. E.
28	10	59	I. Oc. D.
	14	25.1	I.*Ec. R.

Note.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

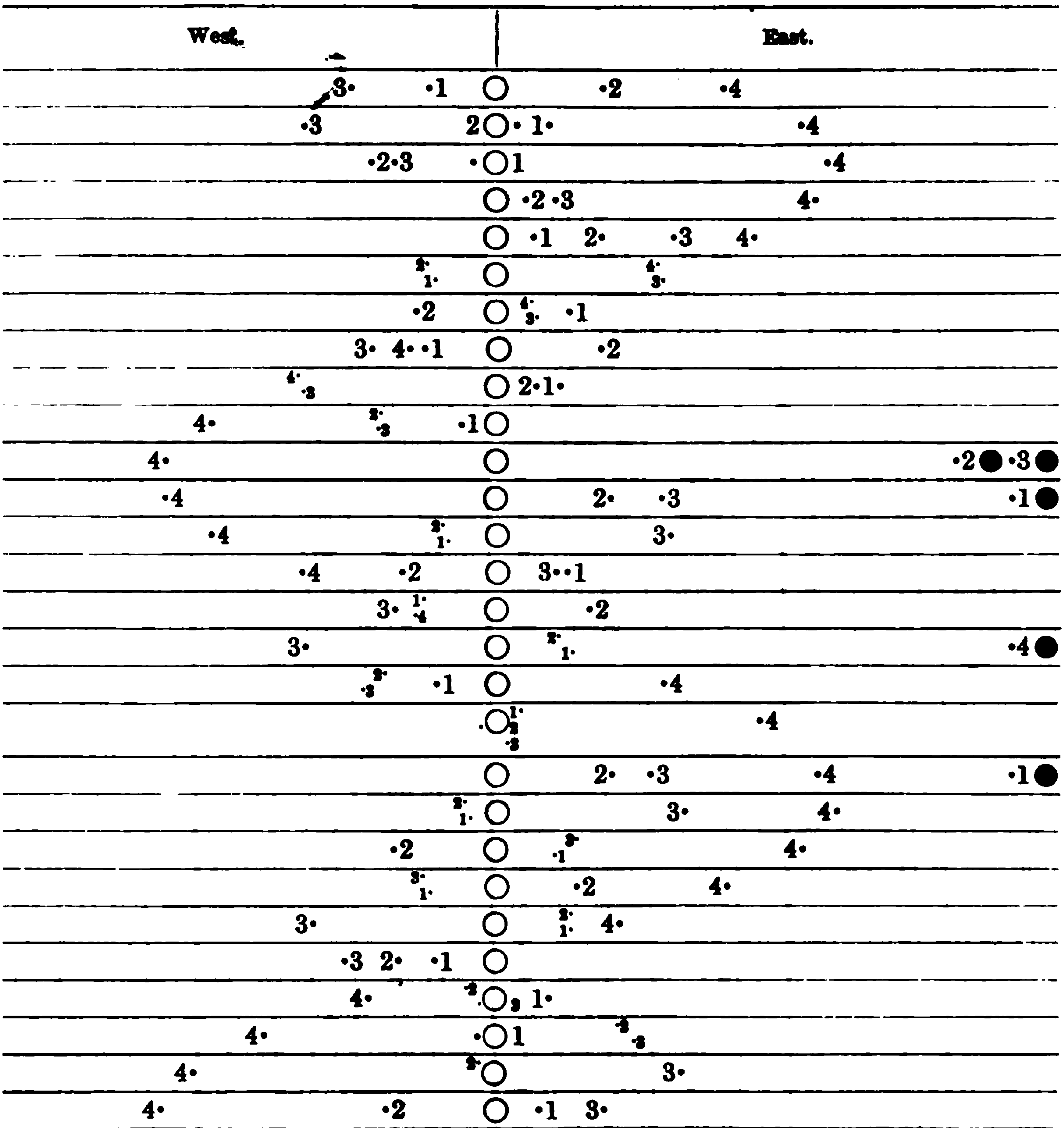
GREENWICH MEAN TIME.

FEBRUARY.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 15ʰ 45ᵐ for an Inverting Telescope.



GREENWICH MEAN TIME.

MARCH.

d	h	m	
1	6	8	III. Tr. I.
	7	26	II. Oc. D.
	8	15	I. Tr. I.
	9	17	III. Tr. E.
	9	23	I. Sh. I.
	10	29	I. Tr. E.
	10	46	III. Sh. I.
	11	37	I.*Sh. E.
	12	25.7	II.*Ec. R.
	14	3	III.*Sh. E.
2	5	26	I. Oc. D.
	8	53.9	I. Ec. R.
3	2	1	II. Tr. I.
	2	42	I. Tr. I.
	3	52	I. Sh. I.
	4	25	II. Sh. I.
	4	43	II. Tr. E.
	4	56	I. Tr. E.
	6	6	I. Sh. E.
	7	8	II. Sh. E.
	23	54	I. Oc. D.
4	3	22.9	I. Ec. R.
	19	47	III. Oc. D.
	20	39	II. Oc. D.
	21	10	I. Tr. I.
	21	58	IV. Oc. D.
	22	20	I. Sh. I.
	22	59	III. Oc. R.
	23	24	I. Tr. E.
5	0	23	IV. Oc. R.
	0	35	I. Sh. E.
	0	35.5	III. Ec. D.
	1	43.3	II. Ec. R.
	3	55.0	III. Ec. R.
	9	13.8	IV. Ec. D.
	12	12.3	IV.*Ec. R.
	18	22	I.*Oc. D.
	21	51.7	I. Ec. R.
6	15	17	II.*Tr. I.
	15	38	I.*Tr. I.
	16	49	I.*Sh. I.
	17	44	II.*Sh. I.
	17	52	I.*Tr. E.
	17	59	II.*Tr. E.
	19	3	I.*Sh. E.
	20	28	II. Sh. E.
7	12	50	I.*Oc. D.
	16	20.7	I.*Ec. R.
8	9	53	III. Tr. I.
	9	53	II. Oc. D.
	10	6	I. Tr. I.
	11	18	I. Sh. I.
	12	20	I.*Tr. E.
	13	3	III.*Tr. E.
8	13	32	I.*Sh. E.
	14	46	III.*Sh. I.
	15	1.0	II.*Ec. R.
	18	4	III.*Sh. E.
9	7	18	I. Oc. D.
	10	49.6	I. Ec. R.
10	4	32	II. Tr. I.
	4	34	I. Tr. I.
	5	47	I. Sh. I.
	6	48	I. Tr. E.
	7	3	II. Sh. I.
	7	14	II. Tr. E.
	8	1	I. Sh. E.
	9	47	II. Sh. E.
11	1	47	I. Oc. D.
	5	18.6	I. Ec. R.
	23	2	I. Tr. I.
	23	8	II. Oc. D.
	23	34	III. Oc. D.
12	0	15	I. Sh. I.
	1	16	I. Tr. E.
	2	30	I. Sh. E.
	2	47	III. Oc. R.
	4	18.6	II. Ec. R.
	4	35.4	III. Ec. D.
	7	55.8	III. Ec. R.
	20	15	I. Oc. D.
	23	47.4	I. Ec. R.
13	7	4	IV. Tr. I.
	9	32	IV. Tr. E.
	17	30	I.*Tr. I.
	17	49	II.*Tr. I.
	18	32	IV.*Sh. I.
	18	44	I.*Sh. I.
	19	44	I. Tr. E.
	20	22	II. Sh. I.
	20	31	II. Tr. E.
	20	58	I. Sh. E.
	21	33	IV. Sh. E.
	23	6	II. Sh. E.
14	14	43	I.*Oc. D.
	18	16.3	I.*Ec. R.
15	11	59	I.*Tr. I.
	12	23	II.*Oc. D.
	13	13	I.*Sh. I.
	13	43	III.*Tr. I.
	14	12	I.*Tr. E.
	15	27	I.*Sh. E.
	16	53	III.*Tr. E.
	17	36.3	II.*Ec. R.
	18	46	III.*Sh. I.
	22	4	III. Sh. E.
16	9	12	I. Oc. D.
16	12	45.2	I.*Ec. R.
17	6	27	I. Tr. I.
	7	6	II. Tr. I.
	7	41	I. Sh. I.
	8	41	I. Tr. E.
	9	41	II. Sh. I.
	9	48	II. Tr. E.
	9	56	I. Sh. E.
	12	25	II.*Sh. E.
18	3	40	I. Oc. D.
	7	14.2	I. Ec. R.
19	0	55	I. Tr. I.
	1	39	II. Oc. D.
	2	10	I. Sh. I.
	3	9	I. Tr. E.
	3	26	III. Oc. D.
	4	25	I. Sh. E.
	6	40	III. Oc. R.
	6	54.0	II. Ec. R.
	8	36.0	III. Ec. D.
	11	57.1	III.*Ec. R.
	22	9	I. Oc. D.
20	1	43.0	I. Ec. R.
	19	24	I. Tr. I.
	20	24	II. Tr. I.
	20	39	I. Sh. I.
	21	37	I. Tr. E.
	22	53	I. Sh. E.
	23	0	II. Sh. I.
	23	6	II. Tr. E.
21	1	44	II. Sh. E.
	15	9	IV.*Oc. D.
	16	37	I.*Oc. D.
	17	42	IV.*Oc. R.
	20	12.0	I. Ec. R.
22	3	16.9	IV. Ec. D.
	6	25.9	IV. Ec. R.
	13	52	I.*Tr. I.
	14	56	II.*Oc. D.
	15	8	I.*Sh. I.
	16	6	I.*Tr. E.
	17	22	I.*Sh. E.
	17	37	III.*Tr. I.
	20	11.7	II. Ec. R.
	20	48	III. Tr. E.
	22	46	III. Sh. I.
23	2	5	III. Sh. E.
	11	6	I. Oc. D.
	14	40.9	I.*Ec. R.
24	8	21	I. Tr. I.
	9	36	I. Sh. I.
	9	42	II. Tr. I.
	10	34	I. Tr. E.
24	11	51	I. Sh. E.
	12	19	II.*Sh. I.
	12	24	II.*Tr. E.
	15	3	II.*Sh. E.
25	5	35	I. Oc. D.
	9	9.9	I. Ec. R.
26	2	49	I. Tr. I.
	4	5	I. Sh. I.
	4	13	II. Oc. D.
	5	3	I. Tr. E.
	6	20	I. Sh. E.
	7	23	III. Oc. D.
	9	29.4	II. Ec. R.
	10	38	III. Oc. R.
	12	36.4	III.*Ec. D.
	15	58.3	III.*Ec. R.
27	0	3	I. Oc. D.
	3	38.7	I. Ec. R.
	21	18	I. Tr. I.
	22	34	I. Sh. I.
	23	1	II. Tr. I.
	23	32	I. Tr. E.
28	0	48	I. Sh. E.
	1	38	II. Sh. I.
	1	43	II. Tr. E.
	4	23	II. Sh. E.
	18	32	I. Oc. D.
	22	7.6	I. Ec. R.
29	15	47	I.*Tr. I.
	17	3	I.*Sh. I.
	17	30	II.*Oc. D.
	18	0	I.*Tr. E.
	19	17	I. Sh. E.
	21	35	III. Tr. I.
	22	47.2	II. Ec. R.
30	0	42	IV. Tr. I.
	0	47	III. Tr. E.
	2	46	III. Sh. I.
	3	19	IV. Tr. E.
	6	5	III. Sh. E.
	12	33	IV.*Sh. I.
	13	1	I.*Oc. D.
	15	44	IV.*Sh. E.
	16	36.5	I.*Ec. R.
31	10	15	I. Tr. I.
	11	31	I. Sh. I.
	12	20	II.*Tr. I.
	12	29	I.*Tr. E.
	13	46	I.*Sh. E.
	14	57	II.*Sh. I.
	15	2	II.*Tr. E.
	17	41	II.*Sh. E.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

MEAN TIME.

GREENWICH MEAN TIME.

APRIL.

d	h	m	
1	7	30	I. Oc. D.
	11	5.5	I. Ec. R.
2	4	44	I. Tr. I.
	6	0	I. Sh. I.
	6	48	II. Oc. D.
	6	58	I. Tr. E.
	8	15	I. Sh. E.
	11	25	III. Oc. D.
	12	5.0	II.*Ec. R.
	14	40	III.*Oc. R.
	16	37.4	III.*Ec. D.
	20	0.1	III. Ec. R.
3	1	59	I. Oc. D.
	5	34.3	I. Ec. R.
	23	13	I. Tr. I.
4	0	29	I. Sh. I.
	1	27	I. Tr. E.
	1	40	II. Tr. I.
	2	43	I. Sh. E.
	4	16	II. Sh. I.
	4	22	II. Tr. E.
	7	1	II. Sh. E.
	20	28	I. Oc. D.
5	0	3.3	I. Ec. R.
	17	42	I. Tr. I.
	18	58	I. Sh. I.
	19	56	I. Tr. E.
	20	6	II. Oc. D.
	21	12	I. Sh. E.
6	1	22.8	II. Ec. R.
	1	37	III. Tr. I.
	4	50	III. Tr. E.
	6	45	III. Sh. I.
	10	6	III. Sh. E.
	14	57	I.*Oc. D.
	18	32.1	I. Ec. R.
7	9	15	IV. Oc. D.
	11	58	IV. Oc. R.
	12	11	I.*Tr. I.
	13	26	I.*Sh. I.
	14	25	I.*Tr. E.
	14	59	II.*Tr. I.
	15	41	I.*Sh. E.
	17	35	II. Sh. I.
	17	42	II. Tr. E.
	20	20	II. Sh. E.
	21	19.9	IV. Ec. D.
8	0	38.6	IV. Ec. R.
	9	27	I. Oc. D.
	13	1.1	I.*Ec. R.
9	6	40	I. Tr. I.
	7	55	I. Sh. I.
	8	54	I. Tr. E.
	9	25	II. Oc. D.

d	h	m	
9	10	10	I. Sh. E.
	14	40.6	II.*Ec. R.
	15	30	III.*Oc. D.
	18	46	III. Oc. R.
	20	37.6	III. Ec. D.
10	0	1.2	III. Ec. R.
	3	56	I. Oc. D.
	7	29.9	I. Ec. R.
11	1	9	I. Tr. I.
	2	24	I. Sh. I.
	3	23	I. Tr. E.
	4	20	II. Tr. I.
	4	39	I. Sh. E.
	6	54	II. Sh. I.
	7	3	II. Tr. E.
	9	39	II. Sh. E.
	22	25	I. Oc. D.
12	1	58.9	I. Ec. R.
	19	39	I. Tr. I.
	20	53	I. Sh. I.
	21	53	I. Tr. E.
	22	45	II. Oc. D.
	23	7	I. Sh. E.
13	3	58.4	II. Ec. R.
	5	43	III. Tr. I.
	8	57	III. Tr. E.
	10	45	III. Sh. I.
	14	6	III.*Sh. E.
	16	55	I.*Oc. D.
	20	27.7	I. Ec. R.
14	14	8	I.*Tr. I.
	15	21	I.*Sh. I.
	16	22	I.*Tr. E.
	17	36	I. Sh. E.
	17	41	II. Tr. I.
	20	13	II. Sh. I.
	20	24	II. Tr. E.
	22	58	II. Sh. E.
15	11	24	I. Oc. D.
	14	56.7	I.*Ec. R.
	19	10	IV. Tr. I.
	21	57	IV. Tr. E.
16	6	34	IV. Sh. I.
	8	37	I. Tr. I.
	9	50	I. Sh. I.
	9	53	IV. Sh. E.
	10	51	I. Tr. E.
	12	4	II. Oc. D.
	12	5	I. Sh. E.
	17	16.3	II. Ec. R.
	19	38	III. Oc. D.
	22	55	III. Oc. R.
17	0	37.6	III. Ec. D.
	4	1.8	III. Ec. R.

d	h	m	
17	5	54	I. Oc. D.
	9	25.5	I. Ec. R.
18	3	6	I. Tr. I.
	4	19	I. Sh. I.
	5	21	I. Tr. E.
	6	34	I. Sh. E.
	7	3	II. Tr. I.
	9	32	II. Sh. I.
	9	46	II. Tr. E.
	12	17	II.*Sh. E.
19	0	23	I. Oc. D.
	3	54.4	I. Ec. R.
	21	36	I. Tr. I.
	22	48	I. Sh. I.
	23	50	I. Tr. E.
20	1	3	I. Sh. E.
	1	24	II. Oc. D.
	6	34.1	II. Ec. R.
	9	53	III. Tr. I.
	13	7	III.*Tr. E.
	14	45	III.*Sh. I.
	18	7	III. Sh. E.
	18	53	I. Oc. D.
	22	23.2	I. Ec. R.
21	16	5	I.*Tr. I.
	17	16	I. Sh. I.
	18	19	I. Tr. E.
	19	31	I. Sh. E.
	20	24	II. Tr. I.
	22	50	II. Sh. I.
	23	7	II. Tr. E.
22	1	36	II. Sh. E.
	13	22	I.*Oc. D.
	16	52.1	I. Ec. R.
23	10	35	I. Tr. I.
	11	45	I. Sh. I.
	12	49	I.*Tr. E.
	14	0	I.*Sh. E.
	14	45	II.*Oc. D.
	19	52.0	II. Ec. R.
	23	49	III. Oc. D.
24	3	6	III. Oc. R.
	4	9	IV. Oc. D.
	4	37.3	III. Ec. D.
	7	2	IV. Oc. R.
	7	52	I. Oc. D.
	8	2.1	III. Ec. R.
	11	21.0	I. Ec. R.
	15	23.5	IV.*Ec. D.
	18	51.5	IV. Ec. R.
25	5	4	I. Tr. I.
	6	14	I. Sh. I.
	7	18	I. Tr. E.
	8	29	I. Sh. E.

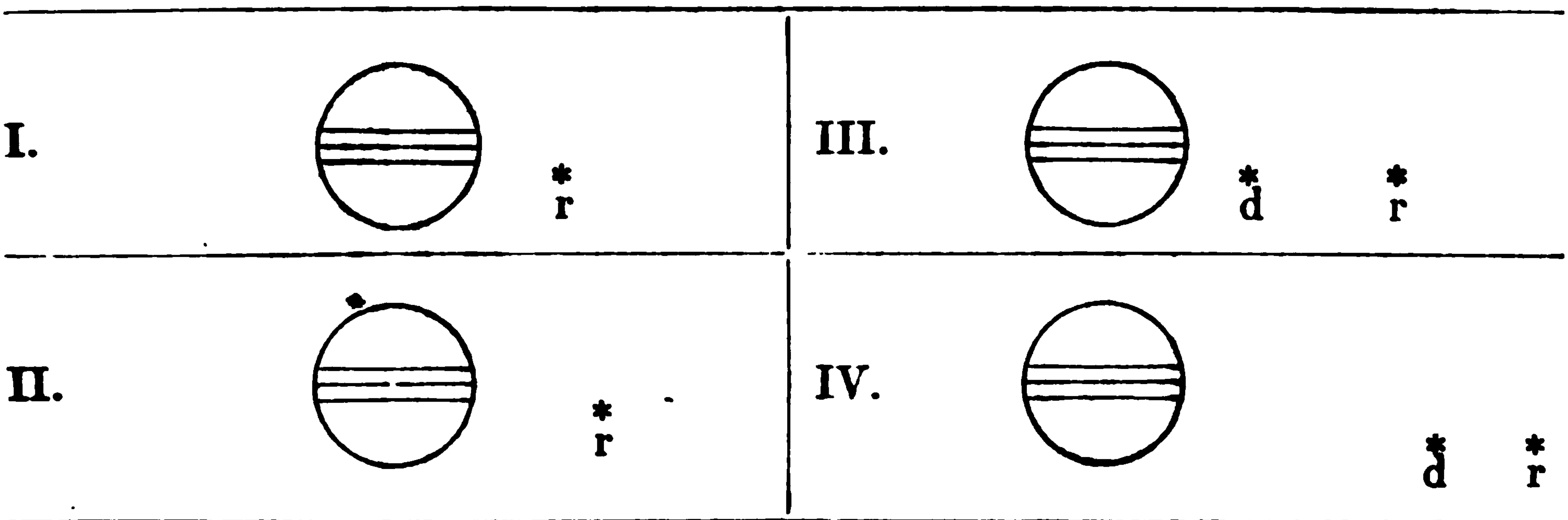
d	h	m	
25	9	46	II. Tr. I.
	12	10	II. Sh. I.
	12	30	II.*Tr. E.
	14	55	II.*Sh. E.
26	2	22	I. Oc. D.
	5	49.9	I. Ec. R.
	23	34	I. Tr. I.
27	0	43	I. Sh. I.
	1	48	I. Tr. E.
	2	58	I. Sh. E.
	4	6	II. Oc. D.
	9	9.9	II. Ec. R.
	14	5	III.*Tr. I.
	17	21	III. Tr. E.
	18	45	III. Sh. I.
	20	51	I. Oc. D.
	22	8	III. Sh. E.
28	0	18.7	I. Ec. R.
	18	3	I. Tr. I.
	19	11	I. Sh. I.
	20	18	I. Tr. E.
	21	26	I. Sh. E.
	23	8	II. Tr. I.
29	1	28	II. Sh. I.
	1	52	II. Tr. E.
	4	13	II. Sh. E.
	15	21	I.*Oc. D.
	18	47.6	I. Ec. R.
30	12	33	I.*Tr. I.
	13	40	I.*Sh. I.
	14	47	I.*Tr. E.
	15	55	I.*Sh. E.
	17	27	II. Oc. D.
	22	27.9	II. Ec. R.

Note.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

APRIL.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 14ʰ 45ᵐ for an Inverting Telescope.

Day.	West.		East.
1	4· ·3 ·2	○	·1
2	4· 1·	○ ·3	·2
3	·4	○	1· 2· ·3
4	·4 2· ·1	○	3·
5	·4 ·2	○	1· 3·
6	·4 3·	○ ·1	·2
7	3· 1·	2· ○	·4
8	·3 ·2	○	·1 ·4
9	1· ·	○	3·2 ·4
10		○	·12· ·3 ·4
11	2· ·1	○	3· ·4
12	·2	○	1· 3· 4·
13	3· ·1	○	·2 4·
14	○1· 3·	○	2· 4·
15	·3 2·	○	4· ·1●
16	4· 1· ·3	○	·2●
17	4·	○	·1 2· ·3
18	4· 1·2·	○	·3
19	4· ·2	○	1· 3·
20	·4 ·1 3·	○	·2
21	·4 3· 1	○	· 2·
22	·4 ·3 2·	○	·1●
23	·4 ·3 1·	○	·2●
24		○	·1 ·4 ·3 2·
25	1· 2·	○	·4·3
26	·2	○	1· 3· ·4
27	○3· ·1	○	·2 ·4
28	3·	○	1· 2· 4·
29	·3 2· ·	○	1 4·
30	○1· ·3 ·2	○	4·

GREENWICH MEAN TIME.

MAY.

d	h	m	Phenomenon
1	4	2	III. Oc. D.
	7	21	III. Oc. R.
	8	36.8	III. Ec. D.
	9	51	I. Oc. D.
	12	2.5	III. Ec. R.
	13	16.4	I.*Ec. R.
2	7	2	I. Tr. I.
	8	9	I. Sh. I.
	9	17	I. Tr. E.
	10	24	I. Sh. E.
	12	31	II.*Tr. I.
	14	18	IV.*Tr. I.
	14	47	II.*Sh. I.
	15	15	II.*Tr. E.
	17	17	IV. Tr. E.
	17	33	II. Sh. E.
3	0	35	IV. Sh. I.
	4	3	IV. Sh. E.
	4	21	I. Oc. D.
	7	45.2	I. Ec. R.
4	1	32	I. Tr. I.
	2	38	I. Sh. I.
	3	47	I. Tr. E.
	4	53	I. Sh. E.
	6	49	II. Oc. D.
	11	45.8	II. Ec. R.
	18	20	III. Tr. I.
	21	37	III. Tr. E.
	22	45	III. Sh. I.
	22	50	I. Oc. D.
5	2	9	III. Sh. E.
	2	14.0	I. Ec. R.
	20	2	I. Tr. I.
	21	6	I. Sh. I.
	22	17	I. Tr. E.
	23	22	I. Sh. E.
6	1	54	II. Tr. I.
	4	5	II. Sh. I.
	4	38	II. Tr. E.
	6	51	II. Sh. E.
	17	20	I. Oc. D.
	20	42.9	I. Ec. R.
7	14	32	I.*Tr. I.
	15	35	I.*Sh. I.
	16	46	I. Tr. E.
	17	50	I. Sh. E.
	20	11	II. Oc. D.
8	1	3.8	II. Ec. R.
	8	19	III. Oc. D.
	11	39	III. Oc. R.
	11	50	I. Oc. D.
	12	37.1	III.*Ec. D.

d	h	m	Phenomenon
8	15	11.7	I.*Ec. R.
	16	3.4	III. Ec. R.
9	9	1	I. Tr. I.
	10	4	I. Sh. I.
	11	16	I. Tr. E.
	12	19	I. Sh. E.
	15	17	II.*Tr. I.
	17	24	II. Sh. I.
	18	1	II. Tr. E.
	20	10	II. Sh. E.
10	6	20	I. Oc. D.
	9	40.6	I. Ec. R.
	23	39	IV. Oc. D.
11	2	45	IV. Oc. R.
	3	31	I. Tr. I.
	4	32	I. Sh. I.
	5	46	I. Tr. E.
	6	48	I. Sh. E.
	9	26.7	IV. Ec. D.
	9	33	II. Oc. D.
	13	3.0	IV.*Ec. R.
	14	21.7	II.*Ec. R.
	22	38	III. Tr. I.
12	0	50	I. Oc. D.
	1	56	III. Tr. E.
	2	45	III. Sh. I.
	4	9.3	I. Ec. R.
	6	9	III. Sh. E.
	22	1	I. Tr. I.
	23	1	I. Sh. I.
13	0	16	I. Tr. E.
	1	17	I. Sh. E.
	4	40	II. Tr. I.
	6	43	II. Sh. I.
	7	24	II. Tr. E.
	9	28	II. Sh. E.
	19	20	I. Oc. D.
	22	38.2	I. Ec. R.
14	16	31	I. Tr. I.
	17	30	I. Sh. I.
	18	46	I. Tr. E.
	19	45	I. Sh. E.
	22	55	II. Oc. D.
15	3	39.8	II. Ec. R.
	12	38	III. Oc. D.
	13	50	I.*Oc. D.
	15	59	III. Oc. R.
	16	37.2	III. Ec. D.
	17	7.0	I. Ec. R.
	20	4.2	III. Ec. R.
16	11	1	I. Tr. I.

d	h	m	Phenomenon
16	11	59	I. Sh. I.
	13	16	I.*Tr. E.
	14	14	I.*Sh. E.
	18	4	II. Tr. I.
	20	1	II. Sh. I.
	20	48	II. Tr. E.
	22	47	II. Sh. E.
17	8	20	I. Oc. D.
	11	35.8	I. Ec. R.
18	5	31	I. Tr. I.
	6	27	I. Sh. I.
	7	46	I. Tr. E.
	8	43	I. Sh. E.
	12	18	II. Oc. D.
	16	57.8	II. Ec. R.
19	2	50	I. Oc. D.
	2	57	III. Tr. I.
	6	4.6	I. Ec. R.
	6	17	III. Tr. E.
	6	44	III. Sh. I.
	9	59	IV. Tr. I.
	10	10	III. Sh. E.
	13	9	IV.*Tr. E.
	18	35	IV. Sh. I.
	22	12	IV. Sh. E.
20	0	1	I. Tr. I.
	0	56	I. Sh. I.
	2	16	I. Tr. E.
	3	12	I. Sh. E.
	7	27	II. Tr. I.
	9	20	II. Sh. I.
	10	12	II. Tr. E.
	12	6	II. Sh. E.
	21	21	I. Oc. D.
21	0	33.4	I. Ec. R.
	18	31	I. Tr. I.
	19	25	I. Sh. I.
	20	46	I. Tr. E.
	21	41	I. Sh. E.
22	1	41	II. Oc. D.
	6	15.9	II. Ec. R.
	15	51	I. Oc. D.
	17	0	III. Oc. D.
	19	2.1	I. Ec. R.
	20	22	III. Oc. R.
	20	37.8	III. Ec. D.
23	0	5.4	III. Ec. R.
	13	1	I.*Tr. I.
	13	53	I.*Sh. I.
	15	16	I. Tr. E.
	16	9	I. Sh. E.
	20	52	II. Tr. I.

d	h	m	Phenomenon
23	22	38	II. Sh. I.
	23	36	II. Tr. E.
24	1	24	II. Sh. E.
	10	21	I. Oc. D.
	13	30.9	I.*Ec. R.
25	7	31	I. Tr. I.
	8	22	I. Sh. I.
	9	46	I. Tr. E.
	10	38	I. Sh. E.
	15	4	II. Oc. D.
	19	33.9	II. Ec. R.
26	4	51	I. Oc. D.
	7	18	III. Tr. I.
	7	50.7	I. Ec. R.
	10	39	III. Tr. E.
	10	44	III. Sh. I.
	14	10	III.*Sh. E.
27	2	1	I. Tr. I.
	2	51	I. Sh. I.
	4	16	I. Tr. E.
	5	7	I. Sh. E.
	10	15	II. Tr. I.
	11	56	II. Sh. I.
	13	0	II.*Tr. E.
	14	43	II.*Sh. E.
	19	38	IV. Oc. D.
	22	57	IV. Oc. R.
	23	21	I. Oc. D.
28	2	28.5	I. Ec. R.
	3	29.4	IV. Ec. D.
	7	13.6	IV. Ec. R.
	20	31	I. Tr. I.
	21	20	I. Sh. I.
	22	46	I. Tr. E.
	23	36	I. Sh. E.
29	4	28	II. Oc. D.
	8	52.0	II. Ec. R.
	17	51	I. Oc. D.
	20	57.2	I. Ec. R.
	21	23	III. Oc. D.
30	4	5.7	III. Ec. R.
	15	1	I. Tr. I.
	15	48	I. Sh. I.
	17	17	I. Tr. E.
	18	4	I. Sh. E.
	23	40	II. Tr. I.
31	1	15	II. Sh. I.
	2	25	II. Tr. E.
	4	1	II. Sh. E.
	12	22	I. Oc. D.
	15	26.0	I. Ec. R.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; *Tr., transit of the satellite*; Sh., transit of the shadow. *Visible at Washington.

MEAN TIME.

By reason of the proximity of JUPITER to the SUN the phenomena of the satellites are not given from June 27 to August 11.

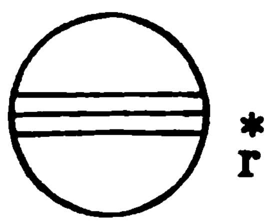
NOTE.—*I.* denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; *Tr., transit of the satellite;* Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

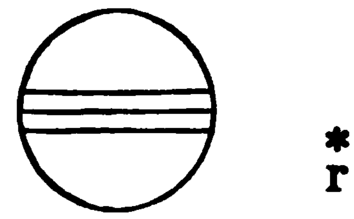
JUNE.

Phases of the Eclipses of the Satellites for an Inverting Telescope.

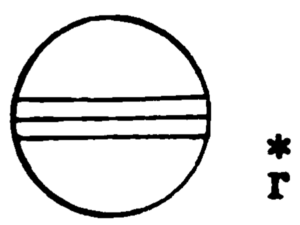
I.



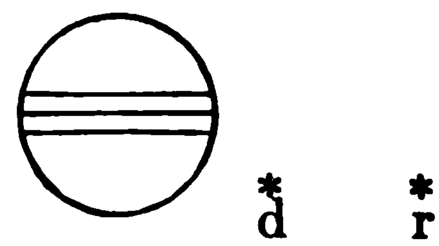
III.



II.



IV.



Configurations at 13ʰ 45ᵐ for an Inverting Telescope.

Day.	West.		East.
1	1· ·2	○	3· 4·
2	○3·	○	·1 ·2 4·
3	○2· 3· 1·	○	4·
4	·3 ·2	○	1· 4·
5	·3·14·	○	·2
6	4·	○	1· ·3 2·
7	4· 2·	·○1	·3
8	○1· 4· ·2	○	3·
9	·4	○	3· ·1 ·2
10	·4 3· 1·	○	2·
11	·4 ·3 2·	○	·1
12	·4·3 ·1	○	·2 ●
13	·	○	4 ·3 1· 2·
14	2· ·1	○	·4 ·3
15	○1· ·2	○	3· ·4
16		○	·13· ·2 ·4
17	3· 1·	○	2· ·4
18	3· 2·	○	·1 4·
19	·3 1·	○	4· ·2 ●
20		○	1· 2· 4· ·3 ●
21	2· ·1	○	4· ·3
22	·2 4·	○	1· 3·
23	4·	○	3· ·2 ·1 ●
24	4· 3· 1·	○	2·
25	4· 3· 2·	○	·1
26	·4 ·3 1· ·2	○	

GREENWICH MEAN TIME.

SEPTEMBER.

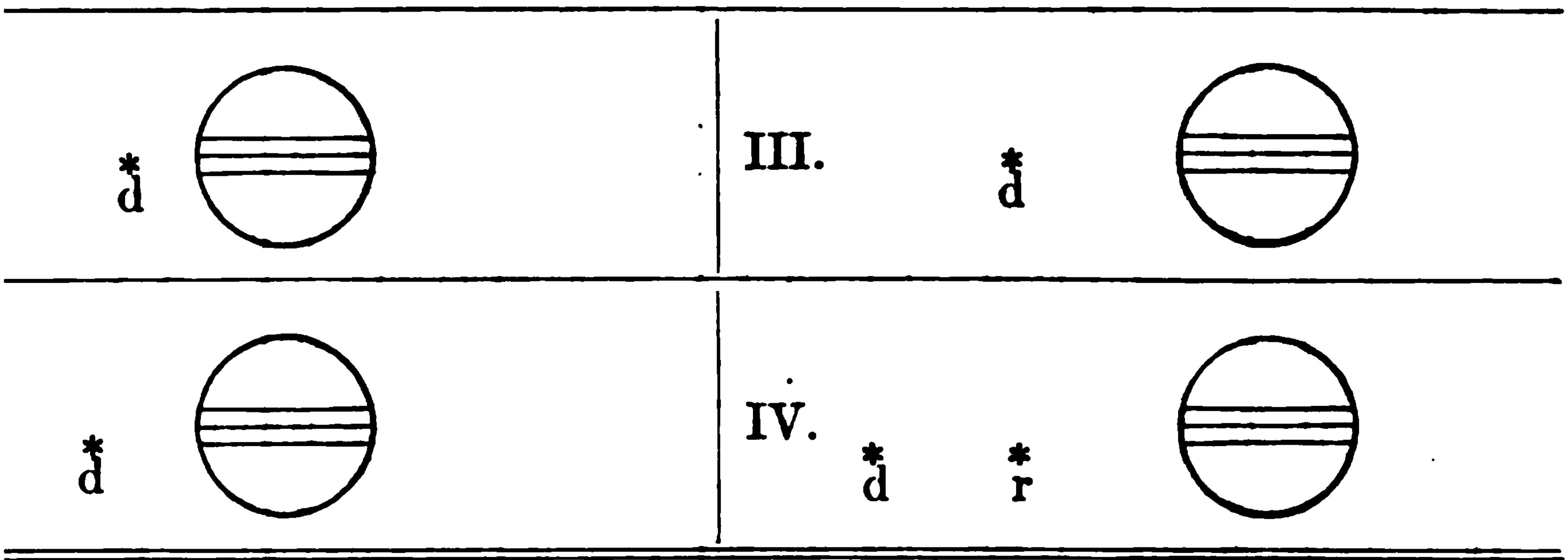
d	h	m	Phenomenon
1	11	5	I. Sh. I.
	11	46	I. Tr. I.
	13	23	I. Sh. E.
	14	4	I. Tr. E.
2	5	14.3	II. Ec. D.
	8	22.2	I. Ec. D.
	9	32	II. Oc. R.
	11	21	I. Oc. R.
3	5	34	I. Sh. I.
	6	16	I. Tr. I.
	7	51	I. Sh. E.
	8	34	I. Tr. E.
	18	31	III. Sh. I.
	21	25	III.*Tr. I.
	22	5	III.*Sh. E.
4	0	8	II. Sh. I.
	1	1	III. Tr. E.
	1	32	II. Tr. I.
	2	50.6	I. Ec. D.
	2	55	II. Sh. E.
	4	21	II. Tr. E.
	5	51	I. Oc. R.
5	0	3	I. Sh. I.
	0	46	I. Tr. I.
	2	20	I. Sh. E.
	3	4	I. Tr. E.
	15	39.0	IV. Ec. D.
	18	32.9	II. Ec. D.
	19	59.9	IV. Ec. R.
	21	19.0	I.*Ec. D.
	22	47	IV. Oc. D.
	22	57	II. Oc. R.
6	0	21	I. Oc. R.
	3	18	IV. Oc. R.
	18	31	I. Sh. I.
	19	16	I. Tr. I.
	20	49	I.*Sh. E.
	21	34	I.*Tr. E.
7	8	22.3	III. Ec. D.
	13	25	II. Sh. I.
	14	55	II. Tr. I.
	15	6	III. Oc. R.
	15	47.3	I. Ec. D.
	16	12	II. Sh. E.
	17	43	II. Tr. E.
	18	51	I. Oc. R.
8	13	0	I. Sh. I.
	13	46	I. Tr. I.
	15	17	I. Sh. E.
	16	4	I. Tr. E.
9	7	50.7	II. Ec. D.
	10	15.7	I. Ec. D.
	12	21	II. Oc. R.
9	13	20	I. Oc. R.
10	7	28	I. Sh. I.
	8	16	I. Tr. I.
	9	46	I. Sh. E.
	10	34	I. Tr. E.
	22	30	III. Sh. I.
11	1	48	III. Tr. I.
	2	5	III. Sh. E.
	2	41	II. Sh. I.
	4	17	II. Tr. I.
	4	44.0	I. Ec. D.
	5	24	III. Tr. E.
	5	29	II. Sh. E.
	7	6	II. Tr. E.
	7	50	I. Oc. R.
12	1	57	I. Sh. I.
	2	46	I. Tr. I.
	4	14	I. Sh. E.
	5	4	I. Tr. E.
	21	9.4	II.*Ec. D.
	23	12.4	I. Ec. D.
13	1	45	II. Oc. R.
	2	20	I. Oc. R.
	20	25	I.*Sh. I.
	21	16	I.*Tr. I.
	22	43	I. Sh. E.
	23	34	I. Tr. E.
14	0	30	IV. Sh. I.
	4	48	IV. Sh. E.
	8	27	IV. Tr. I.
	12	20.2	III. Ec. D.
	12	56	IV. Tr. E.
	15	58	II. Sh. I.
	17	39	II. Tr. I.
	17	40.7	I. Ec. D.
	18	46	II. Sh. E.
	19	28	III. Oc. R.
	20	28	II.*Tr. E.
	20	50	I.*Oc. R.
15	14	54	I. Sh. I.
	15	46	I. Tr. I.
	17	11	I. Sh. E.
	18	4	I. Tr. E.
16	10	27.1	II. Ec. D.
	12	9.0	I. Ec. D.
	15	9	II. Oc. R.
	15	19	I. Oc. R.
17	9	22	I. Sh. I.
	10	16	I. Tr. I.
	11	40	I. Sh. E.
	12	34	I. Tr. E.
18	2	29	III. Sh. I.
18	5	15	II. Sh. I.
	6	3	III. Sh. E.
	6	9	III. Tr. I.
	6	37.4	I. Ec. D.
	7	1	II. Tr. I.
	8	2	II. Sh. E.
	9	45	III. Tr. E.
	9	49	I. Oc. R.
	9	50	II. Tr. E.
19	3	51	I. Sh. I.
	4	46	I. Tr. I.
	6	8	I. Sh. E.
	7	3	I. Tr. E.
	23	45.8	II. Ec. D.
20	1	5.7	I. Ec. D.
	4	19	I. Oc. R.
	4	33	II. Oc. R.
	22	19	I.*Sh. I.
	23	16	I. Tr. I.
21	0	37	I. Sh. E.
	1	33	I. Tr. E.
	16	17.8	III. Ec. D.
	18	32	II. Sh. I.
	19	34.0	I.*Ec. D.
	19	53.8	III.*Ec. R.
	20	9	III.*Oc. D.
	20	23	II.*Tr. I.
	21	19	II.*Sh. E.
	22	48	I. Oc. R.
	23	12	II. Tr. E.
	23	47	III. Oc. R.
22	9	39.5	IV. Ec. D.
	14	5.1	IV. Ec. R.
	16	48	I. Sh. I.
	17	45	I. Tr. I.
	18	51	IV. Oc. D.
	19	5	I. Sh. E.
	20	3	I.*Tr. E.
	23	29	IV. Oc. R.
23	13	3.5	II. Ec. D.
	14	2.3	I. Ec. D.
	17	18	I. Oc. R.
	17	56	II. Oc. R.
24	11	16	I. Sh. I.
	12	15	I. Tr. I.
	13	34	I. Sh. E.
	14	33	I. Tr. E.
25	6	28	III. Sh. I.
	7	48	II. Sh. I.
	8	30.6	I. Ec. D.
	9	45	II. Tr. I.
	10	3	III. Sh. E.
	10	28	III. Tr. I.
	10	36	II. Sh. E.
25	11	47	I. Oc. R.
	12	33	II. Tr. E.
	14	5	III. Tr. E.
26	5	45	I. Sh. I.
	6	45	I. Tr. I.
	8	2	I. Sh. E.
	9	2	I. Tr. E.
27	2	23.1	II. Ec. D.
	2	58.9	I. Ec. D.
	6	17	I. Oc. R.
	7	20	II. Oc. R.
28	0	13	I. Sh. I.
	1	14	I. Tr. I.
	2	31	I. Sh. E.
	3	32	I. Tr. E.
	20	15.4	III.*Ec. D.
	21	5	II.*Sh. I.
	21	27.2	I.*Ec. D.
	23	6	II. Tr. I.
	23	51.8	III. Ec. R.
	23	53	II. Sh. E.
29	0	28	III. Oc. D.
	0	46	I. Oc. R.
	1	55	II. Tr. E.
	4	5	III. Oc. R.
	18	42	I. Sh. I.
	19	44	I.*Tr. I.
	20	59	I.*Sh. E.
	22	1	I.*Tr. E.
30	15	39.8	II. Ec. D.
	15	55.5	I. Ec. D.
	18	28	IV. Sh. I.
	19	15	I.*Oc. R.
	20	42	II.*Oc. R.
	22	49	IV. Sh. E.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; *Tr.*, transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

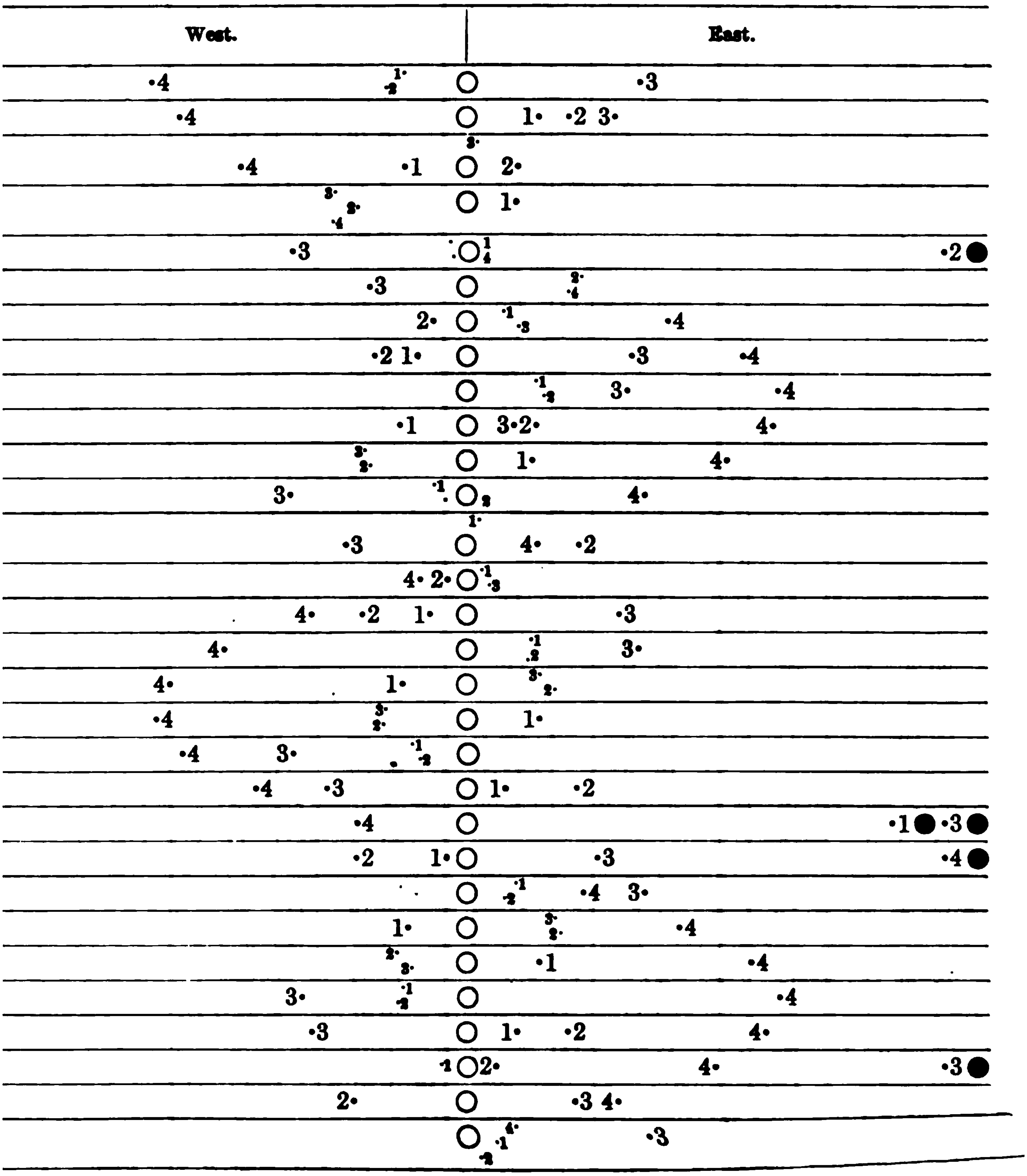
GREENWICH MEAN TIME.

SEPTEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 21ʰ 0ᵐ for an Inverting Telescope.



GREENWICH MEAN TIME.

OCTOBER.

d	h	m	
1	4	13	IV. Tr. I.
	8	47	IV. Tr. E.
	13	10	I. Sh. I.
	14	13	I. Tr. I.
	15	28	I. Sh. E.
	16	31	I. Tr. E.
2	10	22	II. Sh. I.
	10	23.8	I. Ec. D.
	10	27	III. Sh. I.
	12	27	II. Tr. I.
	13	9	II. Sh. E.
	13	45	I. Oc. R.
	14	1	III. Sh. E.
	14	45	III. Tr. I.
	15	16	II. Tr. E.
	18	22	III. Tr. E.
3	7	39	I. Sh. I.
	8	43	I. Tr. I.
	9	56	I. Sh. E.
	11	0	I. Tr. E.
4	4	52.1	I. Ec. D.
	4	58.4	II. Ec. D.
	8	14	I. Oc. R.
	10	5	II. Oc. R.
5	2	7	I. Sh. I.
	3	12	I. Tr. I.
	4	24	I. Sh. E.
	5	30	I. Tr. E.
	23	20.4	I. Ec. D.
	23	38	II. Sh. I.
6	0	13.7	III. Ec. D.
	1	47	II. Tr. I.
	2	26	II. Sh. E.
	2	43	I. Oc. R.
	3	50.4	III. Ec. R.
	4	36	II. Tr. E.
	4	42	III. Oc. D.
	8	21	III. Oc. R.
	20	36	I.*Sh. I.
	21	42	I.*Tr. I.
	22	53	I. Sh. E.
	23	59	I. Tr. E.
7	17	48.6	I. Ec. D.
	18	16.1	II. Ec. D.
	21	13	I.*Oc. R.
	23	27	II. Oc. R.
8	15	4	I. Sh. I.
	16	11	I. Tr. I.
	17	21	I. Sh. E.
	18	29	I. Tr. E.
9	3	38.9	IV. Ec. D.
	8	9.0	IV. Ec. R.
	12	16.9	I. Ec. D.
	12	55	II. Sh. I.

d	h	m	
9	14	25	III. Sh. I.
	14	28	IV. Oc. D.
	15	7	II. Tr. I.
	15	42	I. Oc. R.
	15	42	II. Sh. E.
	17	56	II. Tr. E.
	18	0	III. Sh. E.
	18	59	III.*Tr. I.
	19	11	IV.*Oc. R.
	22	36	III.*Tr. E.
10	9	33	I. Sh. I.
	10	41	I. Tr. I.
	11	50	I. Sh. E.
	12	58	I. Tr. E.
11	6	45.2	I. Ec. D.
	7	34.6	II. Ec. D.
	10	11	I. Oc. R.
	12	49	II. Oc. R.
12	4	1	I. Sh. I.
	5	10	I. Tr. I.
	6	18	I. Sh. E.
	7	27	I. Tr. E.
13	1	13.5	I. Ec. D.
	2	12	II. Sh. I.
	4	11.8	III. Ec. D.
	4	27	II. Tr. I.
	4	40	I. Oc. R.
	4	59	II. Sh. E.
	7	17	II. Tr. E.
	7	48.8	III. Ec. R.
	8	54	III. Oc. D.
	12	34	III. Oc. R.
	22	30	I.*Sh. I.
	23	39	I. Tr. I.
14	0	47	I. Sh. E.
	1	57	I. Tr. E.
	19	41.7	I.*Ec. D.
	20	52.2	II.*Ec. D.
	23	9	I. Oc. R.
15	2	10	II. Oc. R.
	16	58	I. Sh. I.
	18	8	I. Tr. I.
	19	15	I.*Sh. E.
	20	26	I.*Tr. E.
16	14	10.0	I. Ec. D.
	15	28	II. Sh. I.
	17	38	I. Oc. R.
	17	47	II. Tr. I.
	18	16	II.*Sh. E.
	18	23	III.*Sh. I.
	20	36	II.*Tr. E.
	21	58	III.*Sh. E.
	23	10	III. Tr. I.
17	2	47	III. Tr. E.

d	h	m	
17	11	26	I. Sh. I.
	12	26	IV. Sh. I.
	12	38	I. Tr. I.
	13	43	I. Sh. E.
	14	55	I. Tr. E.
	16	51	IV. Sh. E.
	23	28	IV. Tr. I.
18	4	7	IV. Tr. E.
	8	38.3	I. Ec. D.
	10	10.8	II. Ec. D.
	12	7	I. Oc. R.
	15	31	II. Oc. R.
19	5	55	I. Sh. I.
	7	7	I. Tr. I.
	8	12	I. Sh. E.
	9	24	I. Tr. E.
20	3	6.6	I. Ec. D.
	4	45	II. Sh. I.
	6	36	I. Oc. R.
	7	6	II. Tr. I.
	7	32	II. Sh. E.
	8	10.3	III. Ec. D.
	9	55	II. Tr. E.
	11	47.7	III. Ec. R.
	13	5	III. Oc. D.
	16	44	III. Oc. R.
21	0	23	I. Sh. I.
	1	36	I. Tr. I.
	2	40	I. Sh. E.
	3	53	I. Tr. E.
	21	34.8	I.*Ec. D.
	23	28.4	II. Ec. D.
22	1	5	I. Oc. R.
	4	52	II. Oc. R.
	18	52	I.*Sh. I.
	20	5	I.*Tr. I.
	21	9	I.*Sh. E.
	22	22	I.*Tr. E.
23	16	3.1	I. Ec. D.
	18	1	II.*Sh. I.
	19	34	I.*Oc. R.
	20	25	II.*Tr. I.
	20	49	II.*Sh. E.
	22	21	III.*Sh. I.
	23	14	II. Tr. E.
24	1	56	III. Sh. E.
	3	18	III. Tr. I.
	6	55	III. Tr. E.
	13	20	I. Sh. I.
	14	34	I. Tr. I.
	15	37	I. Sh. E.
	16	51	I. Tr. E.
25	10	31.3	I. Ec. D.
	12	46.8	II. Ec. D.

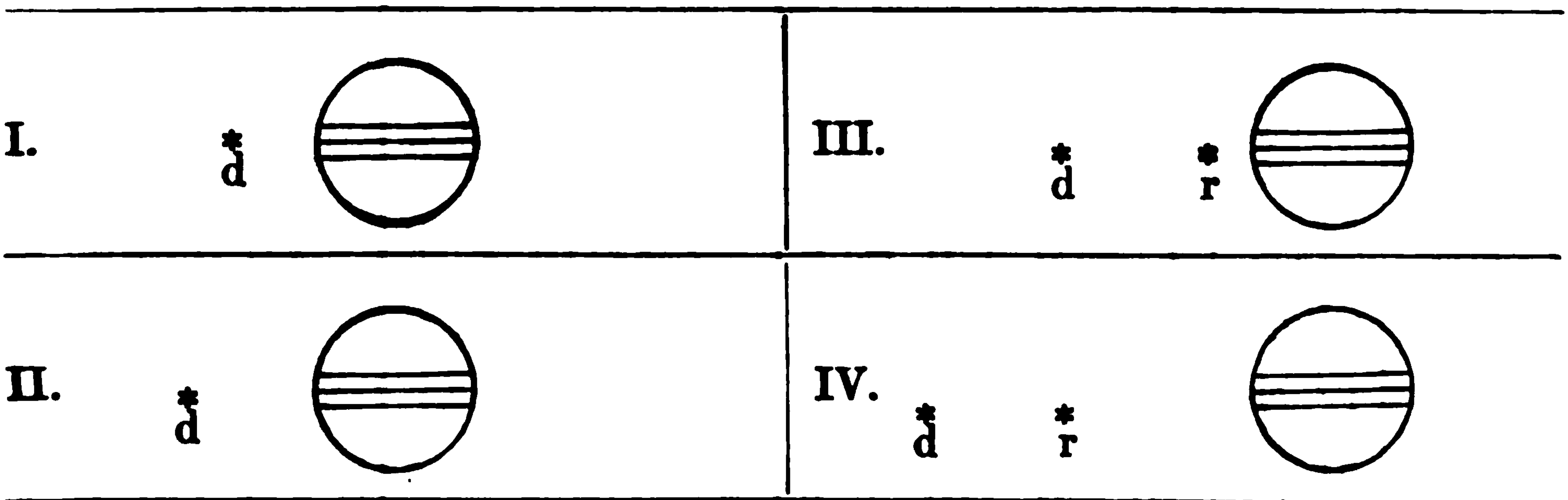
d	h	m	
25	14	3	I. Oc. R.
	18	12	II.*Oc. R.
	21	38.1	IV.*Ec. D.
26	2	12.1	IV. Ec. R.
	7	49	I. Sh. I.
	9	3	I. Tr. I.
	9	28	IV. Oc. D.
	10	6	I. Sh. E.
	11	20	I. Tr. E.
	14	16	IV. Oc. R.
27	4	59.6	I. Ec. D.
	7	18	II. Sh. I.
	8	31	I. Oc. R.
	9	43	II. Tr. I.
	10	6	II. Sh. E.
	12	8.1	III. Ec. D.
	12	33	II. Tr. E.
	15	45.7	III. Ec. R.
	17	11	III. Oc. D.
	20	50	III.*Oc. R.
28	2	17	I. Sh. I.
	3	31	I. Tr. I.
	4	34	I. Sh. E.
	5	49	I. Tr. E.
	23	27.8	I. Ec. D.
29	2	4.4	II. Ec. D.
	3	0	I. Oc. R.
	7	31	II. Oc. R.
	20	46	I.*Sh. I.
	22	0	I.*Tr. I.
	23	3	I. Sh. E.
30	0	17	I. Tr. E.
	17	56.1	I.*Ec. D.
	20	34	II.*Sh. I.
	21	29	I.*Oc. R.
	23	1	II.*Tr. I.
	23	22	II. Sh. E.
31	1	51	II. Tr. E.
	2	20	III. Sh. I.
	5	55	III. Sh. E.
	7	23	III. Tr. I.
	11	0	III. Tr. E.
	15	14	I. Sh. I.
	16	29	I. Tr. I.
	17	31	I.*Sh. E.
	18	46	I.*Tr. E.

Note.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

GREENWICH MEAN TIME.

OCTOBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 20h 45m for an Inverting Telescope.

Day.	West.		East.
1	4· 1·	○	3· 2·
2	4· 2· 3·	○	·1
3	4· 3· ·2 ·1	○	
4	4· ·3	○	1· ·2
5	·4 ·3 ·1	○	2·
6	·4 2· 1	○	· ·3
7	·4	○	·3 ·1● ·2●
8	·4 1·	○	2· 3·
9	○3· 2·	○	·4 ·1
10	3· ·21·	○	·4
11	·3	○	1· ·2
12	·3 ·1	○	2· ·4
13	2·	○	1· ·3 ·4
14	·2	○	·3 4· ·1●
15	1·	○	·2 3· 4·
16	2·	○	3· ·1 4·
17	3· ·2 1· 4	○	·
18	·3 4·	○	·2 ·1
19	4· ·3 ·1	○	2·
20	4· 2·	○	1· ·3
21	4· ·2 ·1	○	·3
22	○1· ·4	○	·2 3·
23	○2· ·4	○	·1 3·
24	·4 3· ·2 1·	○	
25	3· ·4	○	·2 ·1
26	·3 1·	○	·4 2·
27	2·	○	1· ·4 ·3●
28	·2·1	○	·3 ·4
29	1	○	· ·2 3· ·4
30		○	2· 3· 4· ·1●
31	2· 3· 1·	○	4·

GREENWICH MEAN TIME.

NOVEMBER.

d	h	m	
1	12	24.4	I. Ec. D.
	15	22.8	II. Ec. D.
	15	57	I. Oc. R.
	20	51	II.*Oc. R.
2	9	42	I. Sh. I.
	10	58	I. Tr. I.
	11	59	I. Sh. E.
	13	15	I. Tr. E.
3	6	23	IV. Sh. I.
	6	52.6	I. Ec. D.
	9	51	II. Sh. I.
	10	26	I. Oc. R.
	10	51	IV. Sh. E.
	12	19	II. Tr. I.
	12	39	II. Sh. E.
	15	9	II. Tr. E.
	16	5.6	III. Ec. D.
	18	4	IV.*Tr. I.
	19	43.4	III.*Ec. R.
	21	13	III.*Oc. D.
	22	45	IV.*Tr. E.
4	0	53	III. Oc. R.
	4	11	I. Sh. I.
	5	26	I. Tr. I.
	6	28	I. Sh. E.
	7	43	I. Tr. E.
5	1	20.8	I. Ec. D.
	4	40.3	II. Ec. D.
	4	54	I. Oc. R.
	10	9	II. Oc. R.
	22	39	I.*Sh. I.
	23	55	I. Tr. I.
6	0	56	I. Sh. E.
	2	12	I. Tr. E.
	19	49.1	I.*Ec. D.
	23	8	II.*Sh. I.
	23	22	I. Oc. R.
7	1	36	II. Tr. I.
	1	56	II. Sh. E.
	4	26	II. Tr. E.
	6	18	III. Sh. I.
	9	53	III. Sh. E.
	11	24	III. Tr. I.
	15	1	III. Tr. E.
	17	8	I.*Sh. I.
	18	23	I.*Tr. I.
	19	25	I.*Sh. E.
	20	40	I.*Tr. E.
8	14	17.4	I. Ec. D.
	17	51	I.*Oc. R.
	17	58.7	II.*Ec. D.
	23	28	II. Oc. R.
9	11	36	I. Sh. I.

d	h	m	
9	12	52	I. Tr. I.
	13	53	I. Sh. E.
	15	9	I. Tr. E.
10	8	45.6	I. Ec. D.
	12	19	I. Oc. R.
	12	24	II. Sh. I.
	14	53	II. Tr. I.
	15	12	II. Sh. E.
	17	43	II.*Tr. E.
	20	2.9	III.*Ec. D.
	23	41.0	III. Ec. R.
11	1	11	III. Oc. D.
	4	51	III. Oc. R.
	6	4	I. Sh. I.
	7	20	I. Tr. I.
	8	21	I. Sh. E.
	9	37	I. Tr. E.
	15	38.0	IV. Ec. D.
	20	15.3	IV.*Ec. R.
12	3	13.9	I. Ec. D.
	3	44	IV. Oc. D.
	6	47	I. Oc. R.
	7	16.1	II. Ec. D.
	8	34	IV. Oc. R.
	12	45	II. Oc. R.
13	0	33	I. Sh. I.
	1	48	I. Tr. I.
	2	50	I. Sh. E.
	4	5	I. Tr. E.
	21	42.1	I.*Ec. D.
14	1	15	I. Oc. R.
	1	41	II. Sh. I.
	4	9	II. Tr. I.
	4	29	II. Sh. E.
	6	59	II. Tr. E.
	10	16	III. Sh. I.
	13	52	III. Sh. E.
	15	21	III. Tr. I.
	18	58	III.*Tr. E.
	19	1	I.*Sh. I.
	20	16	I.*Tr. I.
	21	18	I.*Sh. E.
	22	33	I.*Tr. E.
15	16	10.5	I. Ec. D.
	19	43	I.*Oc. R.
	20	34.4	II.*Ec. D.
16	2	2	II. Oc. R.
	13	30	I. Sh. I.
	14	45	I. Tr. I.
	15	47	I. Sh. E.
	17	2	I.*Tr. E.
17	10	38.7	I. Ec. D.
	14	11	I. Oc. R.

d	h	m	
17	14	57	II. Sh. I.
	17	25	II.*Tr. I.
	17	46	II.*Sh. E.
	20	15	II.*Tr. E.
18	0	0.3	III. Ec. D.
	3	38.7	III. Ec. R.
	5	5	III. Oc. D.
	7	58	I. Sh. I.
	8	45	III. Oc. R.
	9	13	I. Tr. I.
	10	15	I. Sh. E.
	11	30	I. Tr. E.
19	5	6.9	I. Ec. D.
	8	39	I. Oc. R.
	9	51.9	II. Ec. D.
	15	18	II. Oc. R.
20	0	19	IV. Sh. I.
	2	26	I. Sh. I.
	3	41	I. Tr. I.
	4	43	I. Sh. E.
	4	51	IV. Sh. E.
	5	58	I. Tr. E.
	11	50	IV. Tr. I.
	16	33	IV.*Tr. E.
	23	35.2	I. Ec. D.
21	3	7	I. Oc. R.
	4	14	II. Sh. I.
	6	40	II. Tr. I.
	7	3	II. Sh. E.
	9	30	II. Tr. E.
	14	14	III. Sh. I.
	17	50	III.*Sh. E.
	19	14	III.*Tr. I.
	20	55	I.*Sh. I.
	22	9	I.*Tr. I.
	22	50	III.*Tr. E.
	23	12	I.*Sh. E.
22	0	26	I. Tr. E.
	18	3.5	I.*Ec. D.
	21	35	I.*Oc. R.
	23	10.1	II.*Ec. D.
23	4	34	II. Oc. R.
	15	23	I. Sh. I.
	16	36	I.*Tr. I.
	17	40	I.*Sh. E.
	18	53	I.*Tr. E.
24	12	31.7	I. Ec. D.
	16	3	I.*Oc. R.
	17	31	II.*Sh. I.
	19	54	II.*Tr. I.
	20	19	II.*Sh. E.
	22	45	II.*Tr. E.
25	3	58.5	III. Ec. D.

d	h	m	
25	7	37.1	III. Ec. R.
	8	56	III. Oc. D.
	9	52	I. Sh. I.
	11	4	I. Tr. I.
	12	9	I. Sh. E.
	12	36	III. Oc. R.
	13	21	I. Tr. E.
26	7	0.0	I. Ec. D.
	10	30	I. Oc. R.
	12	27.6	II. Ec. D.
	17	49	II.*Oc. R.
27	4	20	I. Sh. I.
	5	32	I. Tr. I.
	6	37	I. Sh. E.
	7	49	I. Tr. E.
28	1	28.2	I. Ec. D.
	4	58	I. Oc. R.
	6	47	II. Sh. I.
	9	9	II. Tr. I.
	9	36	II. Sh. E.
	9	36.9	IV. Ec. D.
	11	59	II. Tr. E.
	14	17.6	IV. Ec. R.
	18	12	III.*Sh. I.
	21	4	IV.*Oc. D.
	21	48	III.*Sh. E.
	22	48	I.*Sh. I.
	23	1	III.*Tr. I.
29	0	0	I. Tr. I.
	1	5	I. Sh. E.
	1	55	IV. Oc. R.
	2	17	I. Tr. E.
	2	38	III. Tr. E.
	19	56.6	I.*Ec. D.
	23	26	I.*Oc. R.
30	1	45.7	II. Ec. D.
	7	4	II. Oc. R.
	17	17	I.*Sh. I.
	18	27	I.*Tr. I.
	19	34	I.*Sh. E.
	20	44	I.*Tr. E.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

MEAN TIME.

GREENWICH MEAN TIME.

DECEMBER.

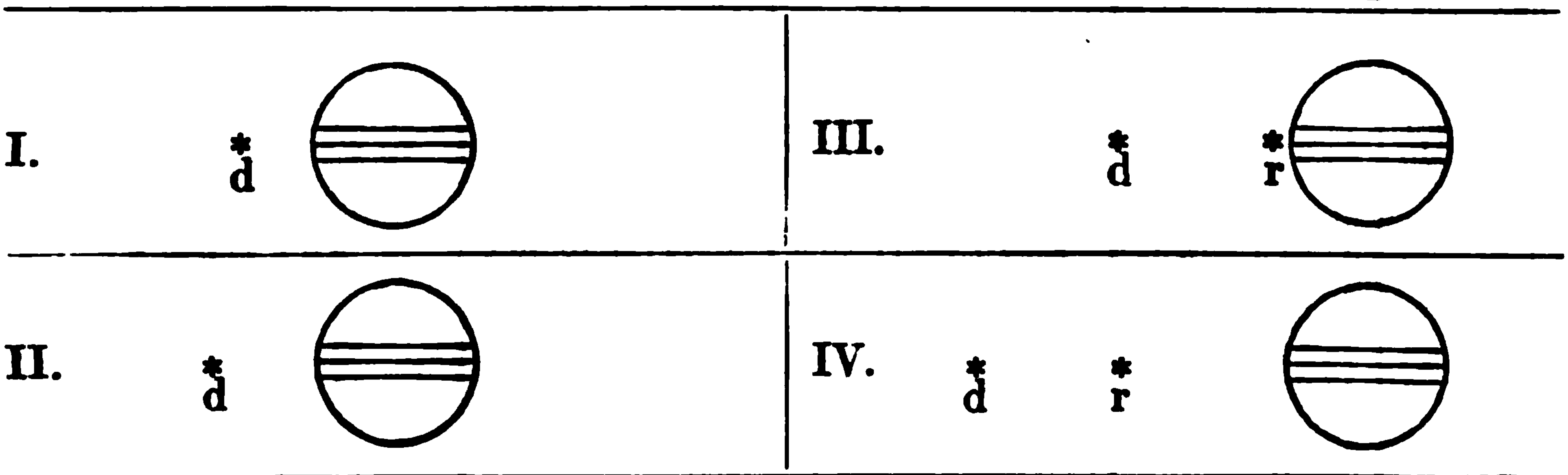
d	h m	
1	14 24.8	I. Ec. D.
	17 53	I.*Oc. R.
	20 4	II.*Sh. I.
	22 22	II.*Tr. I.
	22 53	II.*Sh. E.
2	1 13	II. Tr. E.
	7 56.6	III. Ec. D.
	11 35.4	III. Ec. R.
	11 45	I. Sh. I.
	12 42	III. Oc. D.
	12 55	I. Tr. I.
	14 2	I. Sh. E.
	15 12	I. Tr. E.
	16 21	III.*Oc. R.
3	8 53.1	I. Ec. D.
	12 20	I. Oc. R.
	15 3.1	II. Ec. D.
	20 18	II.*Oc. R.
4	6 13	I. Sh. I.
	7 22	I. Tr. I.
	8 31	I. Sh. E.
	9 39	I. Tr. E.
5	3 21.4	I. Ec. D.
	6 48	I. Oc. R.
	9 21	II. Sh. I.
	11 35	II. Tr. I.
	12 10	II. Sh. E.
	14 26	II. Tr. E.
	22 10	III.*Sh. I.
6	0 42	I. Sh. I.
	1 46	III. Sh. E.
	1 49	I. Tr. I.
	2 45	III. Tr. I.
	2 59	I. Sh. E.
	4 7	I. Tr. E.
	6 21	III. Tr. E.
	18 16	IV.*Sh. I.
	21 49.7	I.*Ec. D.
	22 51	IV.*Sh. E.
7	1 15	I. Oc. R.
	4 21.2	II. Ec. D.
	4 42	IV. Tr. I.
	9 25	IV. Tr. E.
	9 32	II. Oc. R.
	19 10	I.*Sh. I.
	20 17	I.*Tr. I.
	21 27	I.*Sh. E.
	22 34	I.*Tr. E.
8	16 18.0	I.*Ec. D.
	19 42	I.*Oc. R.
	22 37	II.*Sh. I.
9	0 48	II. Tr. I.
	1 27	II. Sh. E.
9	3 39	II. Tr. E.
	11 55.2	III. Ec. D.
	13 39	I. Sh. I.
	14 44	I. Tr. I.
	15 34.2	III.*Ec. R.
	15 56	I.*Sh. E.
	16 23	III.*Oc. D.
	17 1	I.*Tr. E.
	20 2	III.*Oc. R.
10	10 46.3	I. Ec. D.
	14 9	I. Oc. R.
	17 38.6	II.*Ec. D.
	22 44	II.*Oc. R.
11	8 7	I. Sh. I.
	9 11	I. Tr. I.
	10 24	I. Sh. E.
	11 28	I. Tr. E.
12	5 14.6	I. Ec. D.
	8 36	I. Oc. R.
	11 54	II. Sh. I.
	14 0	II. Tr. I.
	14 44	II.*Sh. E.
	16 51	II.*Tr. E.
13	2 8	III. Sh. I.
	2 35	I. Sh. I.
	3 38	I. Tr. I.
	4 53	I. Sh. E.
	5 44	III. Sh. E.
	5 55	I. Tr. E.
	6 23	III. Tr. I.
	10 0	III. Tr. E.
	23 42.9	I.*Ec. D.
14	3 3	I. Oc. R.
	6 56.6	II. Ec. D.
	11 57	II. Oc. R.
	21 4	I.*Sh. I.
	22 5	I.*Tr. I.
	23 21	I.*Sh. E.
15	0 23	I. Tr. E.
	3 36.1	IV. Ec. D.
	8 19.5	IV. Ec. R.
	13 25	IV. Oc. D.
	18 11.2	I.*Ec. D.
	18 16	IV.*Oc. R.
	21 30	I.*Oc. R.
16	1 11	II. Sh. I.
	3 11	II. Tr. I.
	4 1	II. Sh. E.
	6 3	II. Tr. E.
	15 32	I.*Sh. I.
	15 53.1	III.*Ec. D.
	16 32	I.*Tr. I.
	17 49	I.*Sh. E.
	18 50	I.*Tr. E,
16	19 32.3	III.*Ec. R.
	19 59	III.*Oc. D.
	23 38	III.*Oc. R.
17	12 39.6	I. Ec. D.
	15 57	I.*Oc. R.
	20 14.0	II.*Ec. D.
18	1 8	II. Oc. R.
	10 0	I. Sh. I.
	10 59	I. Tr. I.
	12 18	I. Sh. E.
	13 16	I. Tr. E.
19	7 7.9	I. Ec. D.
	10 24	I. Oc. R.
	14 28	II.*Sh. I.
	16 22	II.*Tr. I.
	17 18	II.*Sh. E.
	19 14	II.*Tr. E.
20	4 29	I. Sh. I.
	5 26	I. Tr. I.
	6 6	III. Sh. I.
	6 46	I. Sh. E.
	7 43	I. Tr. E.
	9 43	III. Sh. E.
	9 57	III. Tr. I.
	13 34	III. Tr. E.
21	1 36.3	I. Ec. D.
	4 51	I. Oc. R.
	9 32.0	II. Ec. D.
	14 19	II.*Oc. R.
	22 57	I.*Sh. I.
	23 53	I.*Tr. I.
22	1 15	I. Sh. E.
	2 10	I. Tr. E.
	20 4.6	I.*Ec. D.
	23 17	I.*Oc. R.
23	3 45	II. Sh. I.
	5 33	II. Tr. I.
	6 35	II. Sh. E.
	8 24	II. Tr. E.
	12 12	IV. Sh. I.
	16 50	IV.*Sh. E.
	17 26	I.*Sh. I.
	18 19	I.*Tr. I.
	19 43	I.*Sh. E.
	19 50.9	III.*Ec. D.
	20 33	IV.*Tr. I.
	20 37	I.*Tr. E.
	23 30.1	III.*Ec. R.
	23 30	III.*Oc. D.
24	1 18	IV. Tr. E.
	3 9	III. Oc. R.
	14 32.9	I.*Ec. D.
	17 44	I.*Oc. R.
24	22 49.4	II.*Ec. D.
25	3 30	II. Oc. R.
	11 54	I. Sh. I.
	12 46	I. Tr. I.
	14 11	I.*Sh. E.
	15 3	I.*Tr. E.
26	9 1.3	I. Ec. D.
	12 11	I. Oc. R.
	17 2	II.*Sh. I.
	18 43	II.*Tr. I.
	19 52	II.*Sh. E.
	21 34	II.*Tr. E.
27	6 22	I. Sh. I.
	7 13	I. Tr. I.
	8 40	I. Sh. E.
	9 30	I. Tr. E.
	10 4	III. Sh. I.
	13 27	III. Tr. I.
	13 41	III.*Sh. E.
	17 4	III.*Tr. E.
28	3 29.7	I. Ec. D.
	6 37	I. Oc. R.
	12 7.3	II. Ec. D.
	16 40	II.*Oc. R.
29	0 51	I. Sh. I.
	1 39	I. Tr. I.
	3 8	I. Sh. E.
	3 57	I. Tr. E.
	21 58.0	I.*Ec. D.
30	1 4	I. Oc. R.
	6 18	II. Sh. I.
	7 52	II. Tr. I.
	9 9	II. Sh. E.
	10 44	II. Tr. E.
	19 19	I.*Sh. I.
	20 6	I.*Tr. I.
	21 37	I.*Sh. E.
	22 23	I.*Tr. E.
	23 48.6	III.*Ec. D.
31	6 36	III. Oc. R.
	16 26.4	I.*Ec. D.
	19 30	I.*Oc. R.
	21 36.4	IV.*Ec. D.

NOTE.—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow. *Visible at Washington.

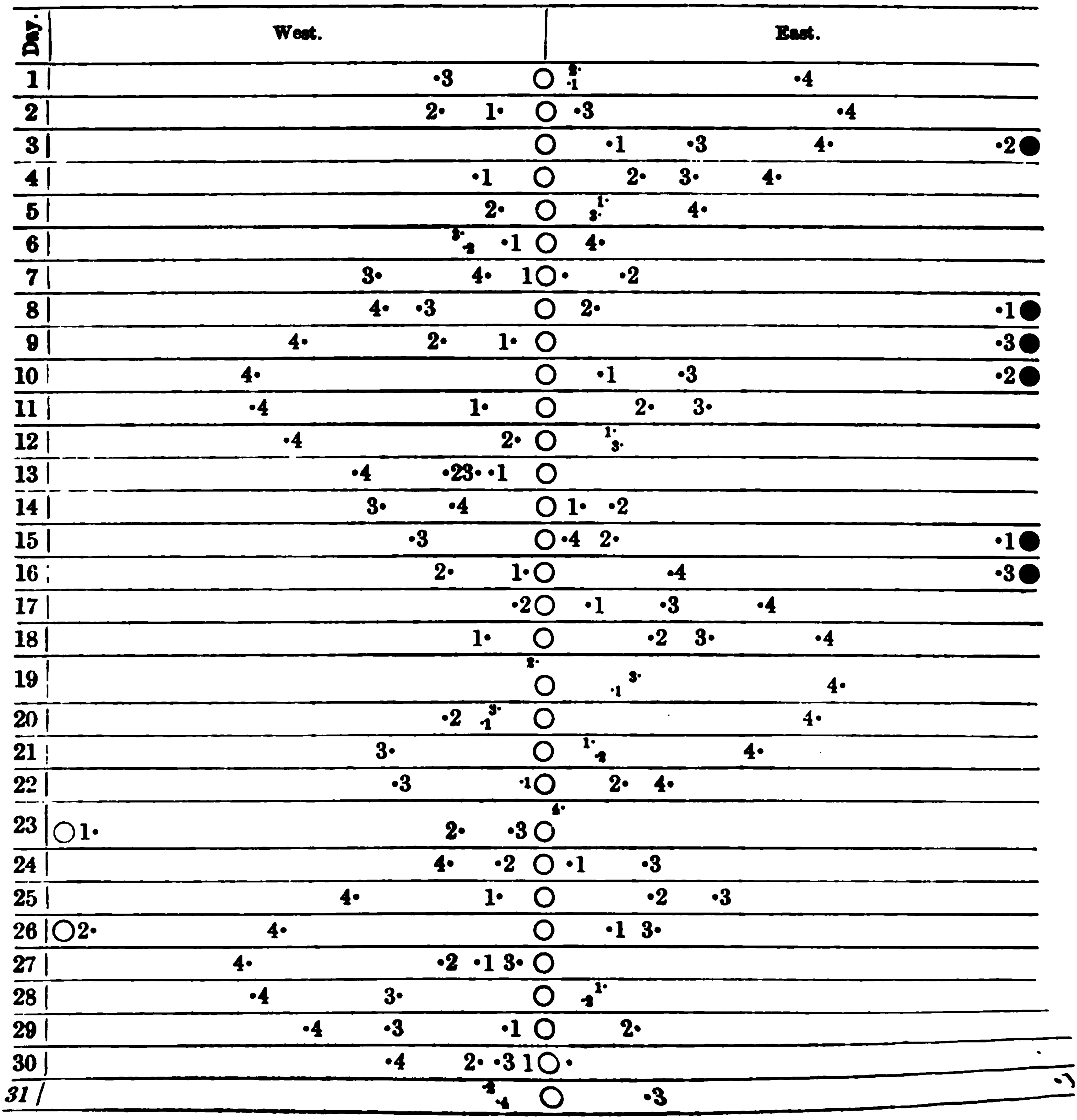
GREENWICH MEAN TIME.

DECEMBER.

Phases of the Eclipses of the Satellites for an Inverting Telescope.



Configurations at 19h 30m for an Inverting Telescope.



ELEMENTS FOR DETERMINING THE GEOCENTRIC POSITION, APPEARANCE, AND MAGNITUDE OF SATURN'S RINGS.

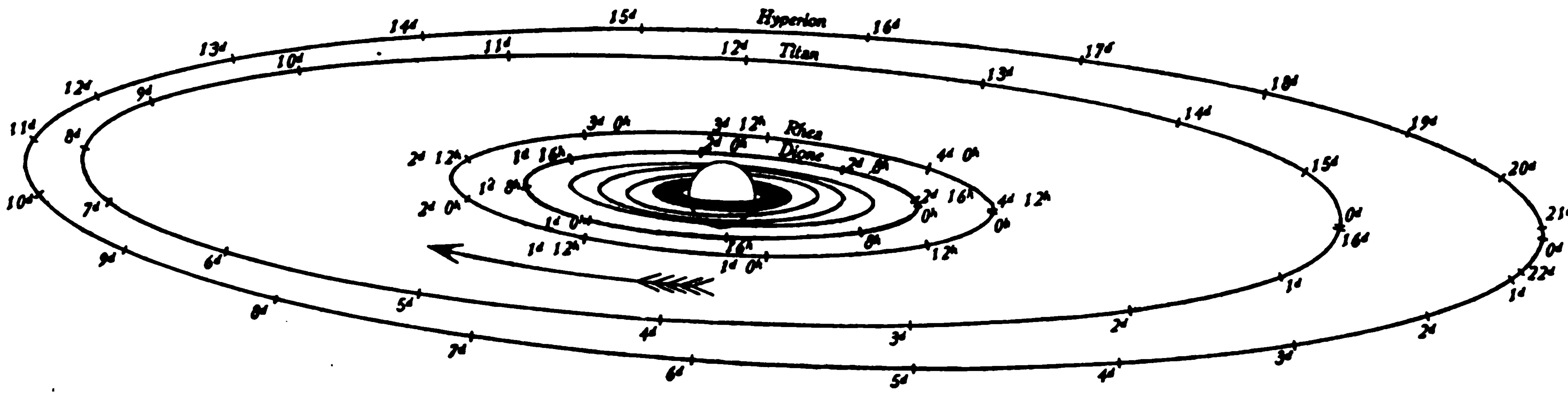
Greenwich Mean Midnight.	*a*	*b*	*P*	*B*	*U*	*ω*	*B′*	*U′*	Stellar Mag.
	″	″	° ′	° ′	° ′	° ′	° ′	° ′	
Jan. 7	44.49	− 8.41	−6 24.9	−10 53.7	24 21.2	42 19.9	−12 34.0	338 18.2	+0.5
15	44.91	8.66	6 26.4	11 7.1	23 57.2	42 19.9	12 27.0	338 34.4	0.4
23	45.24	8.92	6 28.1	11 22.6	23 28.8	42 19.8	12 20.0	338 50.5	0.4
31	45.48	9.19	6 30.1	11 39.5	22 56.9	42 19.8	12 13.0	339 6.7	0.3
Feb. 8	45.61	9.45	6 32.1	11 57.2	22 22.6	42 19.8	12 6.0	339 22.8	0.3
16	45.63	− 9.69	−6 34.2	−12 15.0	21 47.2	42 19.7	−11 59.0	339 38.9	+0.2
24	45.54	9.89	6 36.2	12 32.4	21 12.1	42 19.7	11 52.0	339 54.9	0.3
Mar. 4	45.34	10.06	6 38.0	12 48.7	20 38.5	42 19.7	11 44.9	340 11.0	0.3
12	45.04	10.18	6 39.7	13 3.5	20 7.6	42 19.6	11 37.9	340 27.0	0.4
20	44.65	10.25	6 41.2	13 16.3	19 40.4	42 19.6	11 30.9	340 43.0	0.4
28	44.19	−10.27	−6 42.3	−13 26.5	19 18.0	42 19.5	−11 23.7	340 59.0	+0.4
Apr. 5	43.67	10.24	6 43.2	13 33.9	19 1.0	42 19.5	11 16.6	341 14.9	0.5
13	43.10	10.17	6 43.8	13 38.6	18 49.9	42 19.5	11 9.5	341 30.9	0.5
21	42.51	10.05	6 44.0	13 40.3	18 45.0	42 19.4	11 2.4	341 46.8	0.6
29	41.91	9.89	6 43.9	13 39.0	18 46.4	42 19.4	10 55.2	342 2.7	0.6
May 7	41.31	− 9.69	−6 43.5	−13 34.7	18 54.1	42 19.4	−10 48.1	342 18.6	+0.7
15	40.71	9.46	6 42.7	13 27.5	19 8.0	42 19.3	10 41.0	342 34.4	0.7
23	40.13	9.22	6 41.7	13 17.5	19 27.7	42 19.3	10 33.8	342 50.3	0.7
31	39.58	8.96	6 40.3	13 5.0	19 53.0	42 19.2	10 26.6	343 6.1	0.8
June 8	39.06	8.68	6 38.6	12 50.1	20 23.4	42 19.2	10 19.4	343 21.9	0.8
16	38.59	− 8.39	−6 36.6	−12 33.0	20 58.5	42 19.2	−10 12.2	343 37.7	+0.8
24	38.16	8.09	6 34.4	12 13.8	21 37.8	42 19.1	10 5.0	343 53.4	0.8
July 2	37.78	7.78	6 31.9	11 52.8	22 20.7	42 19.1	9 57.8	344 9.2	0.8
10	37.44	7.47	6 29.2	11 30.2	23 6.8	42 19.1	9 50.6	344 24.9	0.9
18	37.16	7.16	6 26.3	11 6.2	23 55.7	42 19.0	9 43.4	344 40.6	0.9
26	36.93	− 6.85	−6 23.2	−10 41.1	24 46.8	42 19.0	− 9 36.2	344 56.3	+0.9
Aug. 3	36.75	6.54	6 19.9	10 15.1	25 39.5	42 19.0	9 29.0	345 12.0	0.9
11	36.62	6.24	6 16.4	9 48.4	26 33.5	42 18.9	9 21.7	345 27.6	0.9
19	36.55	5.94	6 12.9	9 21.3	27 28.3	42 18.9	9 14.4	345 43.3	0.8
27	36.54	5.65	6 9.2	8 54.0	28 23.4	42 18.8	9 7.2	345 58.9	0.8
Sept. 4	36.58	− 5.37	−6 5.5	− 8 26.7	29 18.3	42 18.8	− 8 59.9	346 14.5	+0.9
12	36.67	5.10	6 1.7	7 59.7	30 12.5	42 18.8	8 52.6	346 30.1	0.9
20	36.82	4.84	5 58.0	7 33.4	31 5.5	42 18.7	8 45.3	346 45.6	1.0
28	37.03	4.60	5 54.3	7 8.0	31 56.9	42 18.7	8 38.0	347 1.2	1.0
Oct. 6	37.29	4.37	5 50.7	6 43.7	32 46.2	42 18.6	8 30.7	347 16.7	1.0
14	37.61	− 4.16	−5 47.2	− 6 20.8	33 32.8	42 18.6	− 8 23.4	347 32.2	+1.1
22	37.97	3.96	5 44.0	5 59.6	34 16.2	42 18.6	8 16.1	347 47.7	1.1
30	38.38	3.79	5 41.0	5 40.5	34 55.9	42 18.5	8 8.8	348 3.2	1.1
Nov. 7	38.84	3.65	5 38.3	5 23.7	35 31.5	42 18.5	8 1.5	348 18.6	1.1
15	39.34	3.53	5 35.9	5 9.4	36 2.4	42 18.5	7 54.1	348 34.1	1.1
23	39.88	− 3.45	−5 33.9	− 4 57.9	36 28.2	42 18.4	− 7 46.8	348 49.5	+1.1
Dec. 1	40.45	3.40	5 32.3	4 49.4	36 48.5	42 18.4	7 39.5	349 4.9	1.0
9	41.03	3.39	5 31.2	4 44.1	37 2.8	42 18.4	7 32.1	349 20.3	1.0
17	41.62	3.41	5 30.6	4 42.1	37 11.0	42 18.3	7 24.8	349 35.7	1.0
25	42.21	3.48	5 30.5	4 43.3	37 13.0	42 18.3	7 17.4	349 51.1	1.0
33	42.78	− 3.58	−5 30.9	− 4 47.9	37 8.7	42 18.2	− 7 10.0	350 6.4	+0.9

The factor to be multiplied by *a* and *b* to obtain the axes of—

The inner ellipse of the outer ring = 0.8801, log factor = 9.9445
The outer ellipse of the inner ring = 0.8599, log factor = 9.9344
The inner ellipse of the inner ring = 0.6650, log factor = 9.8228
The inner ellipse of the dusky ring = 0.5486, log factor = 9.7392

Note.—The negative sign of B indicates that the visible surface of the rings is the southern one.

South



North

Names of the Satellites.	
I.	Mimas.
II.	Enceladus.
III.	Tethys.
IV.	Dione.
V.	Rhea.
VI.	Titan.
VII.	Hyperion.
VIII.	Iapetus.
IX.	Phœbe.

APPARENT ORBITS OF THE SEVEN INNER SATELLITES OF SATURN,

AT DATE OF OPPOSITION, FEBRUARY 14, 1919,

AS SEEN IN AN INVERTING TELESCOPE.

Mean Synodic Periods.	d	h
I.	0	22.6
II.	1	8.9
III.	1	21.3
IV.	2	17.7
V.	4	12.5
VI.	15	23.3
VII.	21	7.6
VIII.	79	22.1
IX.	523	15.6

GREENWICH MEAN TIME.

In the diagram on the preceding page, the points of the orbits marked "0" are those of the eastern elongation, as seen in an inverting telescope. The times of these elongations may be found from the following tables, and the apparent position of a satellite at any other time may be marked on the diagram by setting off on the proper orbit the elapsed interval in days and hours since the last eastern elongation. The orbits of the five inner satellites are regarded as circular, and the time of any greatest elongation not given in the tables may be readily found from those given by adding or subtracting the proper multiple of the mean synodic period. For Titan, Hyperion, and Iapetus the eccentricity is taken into account, and for Iapetus the times both of the greatest elongations and of the conjunctions are given. The following abbreviations are used in the tables:

E., Eastern Elongation. I., Inferior Conjunction (north of planet).
W., Western Elongation. S., Superior Conjunction (south of planet).

MIMAS.

Greatest Elongations Visible in the United States.

	d h		d h		d h		d h		d h		d h
Jan.	1 18.5 W.	Jan.	30 23.5 W.	Feb.	28 17.2 E.	Apr.	1 18.2 E.	May	14 15.4 W.	Nov.	22 0.0 W.
	2 17.1 W.		31 22.1 W.	Mar.	1 15.9 E.		2 16.8 E.		15 14.0 W.		22 22.6 W.
	3 15.7 W.	Feb.	1 20.8 W.		2 14.5 E.		3 15.4 E.		19 19.8 E.		23 21.2 W.
	4 14.3 W.		2 19.4 W.		3 13.1 E.		4 14.0 E.		20 18.5 E.		24 19.9 W.
	5 1.6 E.		3 18.0 W.		4 0.4 W.		5 12.7 E.		21 17.1 E.		25 18.5 W.
	6 0.3 E.		4 16.6 W.		4 11.7 E.		6 22.6 W.		22 15.7 E.		29 1.6 E.
	6 22.9 E.		5 15.2 W.		4 23.0 W.		7 21.2 W.		23 14.3 E.		30 0.3 E.
	7 21.5 E.		6 13.8 W.		5 21.6 W.		8 19.8 W.		24 12.9 E.		30 22.9 E.
	8 20.1 E.		7 1.1 E.		6 20.2 W.		9 18.4 W.		28 18.8 W.	Dec.	1 21.5 E.
	9 18.7 E.		7 12.4 W.		7 18.8 W.		10 17.1 W.		29 17.4 W.		2 20.1 E.
	10 17.3 E.		7 23.7 E.		8 17.5 W.		11 15.7 W.		30 16.0 W.		3 18.7 E.
	11 15.9 E.		8 22.4 E.		9 16.1 W.		12 14.3 W.		31 14.6 W.		4 17.4 E.
	12 14.6 E.		9 21.0 E.		10 14.7 W.		13 12.9 W.	June	1 13.2 W.		7 1.9 W.
	13 1.9 W.		10 19.6 E.		11 13.3 W.		15 21.5 E.		6 17.7 E.		8 0.5 W.
	14 0.5 W.		11 18.2 E.		12 11.9 W.		16 20.1 E.		7 16.3 E.		8 23.1 W.
	14 23.1 W.		12 16.8 E.		12 23.2 E.		17 18.7 E.		8 14.9 E.		9 21.8 W.
	15 21.7 W.		13 15.4 E.		13 21.8 E.		18 17.3 E.		9 13.6 E.		10 20.4 W.
	16 20.3 W.		14 14.0 E.		14 20.5 E.		19 15.9 E.		14 18.0 W.		11 19.0 W.
	17 18.9 W.		15 1.3 W.		15 19.1 E.		20 14.6 E.		15 16.6 W.		12 17.6 W.
	18 17.5 W.		15 12.6 E.		16 17.7 E.		21 13.2 E.		16 15.2 W.		15 2.2 E.
	19 16.2 W.		16 0.0 W.		17 16.3 E.		23 21.7 W.		17 13.8 W.		16 0.8 E.
	20 14.8 W.		16 22.6 W.		18 14.9 E.		24 20.4 W.		. . . .		16 23.4 E.
	21 2.1 E.		17 21.2 W.		19 13.5 E.		25 19.0 W.		. . . .		17 22.0 E.
	21 13.4 W.		18 19.8 W.		20 12.2 E.		26 17.6 W.	Oct.	30 20.4 E.		18 20.6 E.
	22 0.7 E.		19 18.4 W.		20 23.5 W.		27 16.2 W.		31 19.1 E.		19 19.2 E.
	22 23.3 E.		20 17.0 W.		21 22.1 W.		28 14.8 W.	Nov.	5 0.8 W.		20 17.8 E.
	23 21.9 E.		21 15.6 W.		22 20.7 W.		29 13.5 W.		5 23.5 W.		21 16.5 E.
	24 20.5 E.		22 14.2 W.		23 19.3 W.	May	2 20.6 E.		6 22.1 W.		23 2.4 W.
	25 19.1 E.		23 1.6 E.		24 17.9 W.		3 19.2 E.		7 20.7 W.		24 1.0 W.
	26 17.8 E.		23 12.9 W.		25 16.6 W.		4 17.9 E.		8 19.3 W.		24 23.6 W.
	27 16.4 E.		24 0.2 E.		26 15.2 W.		5 16.5 E.		13 1.1 E.		25 22.2 W.
	28 15.0 E.		24 11.5 W.		27 13.8 W.		6 15.1 E.		13 23.7 E.		26 20.8 W.
	29 2.3 W.		24 22.8 E.		28 12.4 W.		7 13.7 E.		14 22.4 E.		27 19.5 W.
	29 13.6 E.		25 21.4 E.		29 22.3 E.		11 19.5 W.		15 21.0 E.		28 18.1 W.
	30 0.9 W.		26 20.0 E.		30 21.0 E.		12 18.2 W.		16 19.6 E.		29 16.7 W.
	30 12.2 E.		27 18.6 E.		31 19.6 E.		13 16.8 W.		21 1.4 W.		31 2.6 E.

GREENWICH MEAN TIME.

ENCELADUS.

	d h		d h		d h		d h		d h		d h
Jan.	1 9.7 E.	Feb.	10 3.1 E.	Mar.	21 20.5 E.	Apr.	30 14.2 E.	June	9 8.1 E.	Nov.	23 13.6 E.
	2 18.6 E.		11 12.0 E.		23 5.4 E.	May	1 23.1 E.		10 17.0 E.		24 22.4 E.
	4 3.4 E.		12 20.8 E.		24 14.3 E.		3 8.0 E.		12 1.9 E.		26 7.3 E.
	5 12.3 E.		14 5.7 E.		25 23.2 E.		4 16.9 E.		13 10.8 E.		27 16.2 E.
	6 21.2 E.		15 14.6 E.		27 8.1 E.		6 1.8 E.		14 19.7 E.		29 1.1 E.
	8 6.1 E.		16 23.5 E.		28 17.0 E.		7 10.7 E.		16 4.6 E.		30 10.0 E.
	9 14.9 E.		18 8.3 E.		30 1.8 E.		8 19.6 E.		17 13.5 E.	Dec.	1 18.9 E.
	10 23.8 E.		19 17.2 E.		31 10.7 E.		10 4.5 E.		18 22.4 E.		3 3.8 E.
	12 8.7 E.		21 2.1 E.	Apr.	1 19.6 E.		11 13.3 E.		20 7.3 E.		4 12.7 E.
	13 17.6 E.		22 11.0 E.		3 4.5 E.		12 22.2 E.		. . . .		5 21.5 E.
	15 2.4 E.		23 19.8 E.		4 13.4 E.		14 7.1 E.		. . . .		7 6.4 E.
	16 11.3 E.		25 4.7 E.		5 22.3 E.		15 16.0 E.	Oct.	29 21.5 E.		8 15.3 E.
	17 20.2 E.		26 13.6 E.		7 7.1 E.		17 0.9 E.		31 6.4 E.		10 0.2 E.
	19 5.1 E.		27 22.5 E.		8 16.0 E.		18 9.8 E.	Nov.	1 15.3 E.		11 9.1 E.
	20 14.0 E.	Mar.	1 7.4 E.		10 0.9 E.		19 18.7 E.		3 0.2 E.		12 18.0 E.
	21 22.8 E.		2 16.2 E.		11 9.8 E.		21 3.6 E.		4 9.1 E.		14 2.9 E.
	23 7.7 E.		4 1.1 E.		12 18.7 E.		22 12.5 E.		5 18.0 E.		15 11.7 E.
	24 16.6 E.		5 10.0 E.		14 3.6 E.		23 21.4 E.		7 2.9 E.		16 20.6 E.
	26 1.5 E.		6 18.9 E.		15 12.4 E.		25 6.3 E.		8 11.8 E.		18 5.5 E.
	27 10.3 E.		8 3.8 E.		16 21.3 E.		26 15.2 E.		9 20.7 E.		19 14.4 E.
	28 19.2 E.		9 12.6 E.		18 6.2 E.		28 0.1 E.		11 5.5 E.		20 23.3 E.
	30 4.1 E.		10 21.5 E.		19 15.1 E.		29 9.0 E.		12 14.4 E.		22 8.2 E.
	31 13.0 E.		12 6.4 E.		21 0.0 E.		30 17.9 E.		13 23.3 E.		23 17.0 E.
Feb.	1 21.8 E.		13 15.3 E.		22 8.9 E.	June	1 2.8 E.		15 8.2 E.		25 1.9 E.
	3 6.7 E.		15 0.1 E.		23 17.8 E.		2 11.7 E.		16 17.1 E.		26 10.8 E.
	4 15.6 E.		16 9.0 E.		25 2.7 E.		3 20.6 E.		18 2.0 E.		27 19.7 E.
	6 0.5 E.		17 17.9 E.		26 11.6 E.		5 5.4 E.		19 10.9 E.		29 4.6 E.
	7 9.3 E.		19 2.8 E.		27 20.4 E.		6 14.3 E.		20 19.8 E.		30 13.4 E.
	8 18.2 E.		20 11.7 E.		29 5.3 E.		7 23.2 E.		22 4.7 E.		31 22.3 E.

TETHYS.

	d h		d h		d h		d h		d h		d h
Jan.	1 21.7 E.	Feb.	10 12.9 E.	Mar.	22 4.0 E.	Apr.	30 19.4 E.	June	9 11.2 E.	Nov.	22 16.2 E.
	3 19.0 E.		12 10.2 E.		24 1.3 E.	May	2 16.8 E.		11 8.5 E.		24 13.5 E.
	5 16.3 E.		14 7.4 E.		25 22.6 E.		4 14.1 E.		13 5.8 E.		26 10.8 E.
	7 13.6 E.		16 4.7 E.		27 19.9 E.		6 11.4 E.		15 3.2 E.		28 8.2 E.
	9 10.9 E.		18 2.0 E.		29 17.2 E.		8 8.7 E.		17 0.5 E.		30 5.5 E.
	11 8.2 E.		19 23.3 E.		31 14.5 E.		10 6.0 E.		18 21.8 E.	Dec.	2 2.8 E.
	13 5.5 E.		21 20.6 E.	Apr.	2 11.8 E.		12 3.3 E.		20 19.2 E.		4 0.1 E.
	15 2.8 E.		23 17.9 E.		4 9.1 E.		14 0.7 E.		. . . .		5 21.4 E.
	17 0.1 E.		25 15.2 E.		6 6.4 E.		15 22.0 E.		. . . .		7 18.7 E.
	18 21.4 E.		27 12.5 E.		8 3.7 E.		17 19.3 E.	Oct.	31 0.4 E.		9 16.0 E.
	20 18.7 E.	Mar.	1 9.8 E.		10 1.0 E.		19 16.6 E.	Nov.	1 21.7 E.		11 13.3 E.
	22 16.0 E.		3 7.1 E.		11 22.3 E.		21 14.0 E.		3 19.0 E.		13 10.6 E.
	24 13.3 E.		5 4.4 E.		13 19.7 E.		23 11.3 E.		5 16.4 E.		15 7.9 E.
	26 10.6 E.		7 1.6 E.		15 17.0 E.		25 8.6 E.		7 13.7 E.		17 5.2 E.
	28 7.8 E.		8 22.9 E.		17 14.3 E.		27 5.9 E.		9 11.0 E.		19 2.6 E.
	30 5.1 E.		10 20.2 E.		19 11.6 E.		29 3.2 E.		11 8.3 E.		20 23.9 E.
Feb.	1 2.4 E.		12 17.5 E.		21 8.9 E.		31 0.6 E.		13 5.6 E.		22 21.2 E.
	2 23.7 E.		14 14.8 E.		23 6.2 E.	June	1 21.9 E.		15 2.9 E.		24 18.5 E.
	4 21.0 E.		16 12.1 E.		25 3.5 E.		3 19.2 E.		17 0.3 E.		26 15.8 E.
	6 18.3 E.		18 9.4 E.		27 0.8 E.		5 16.5 E.		18 21.6 E.		28 13.1 E.
	8 15.6 E.		20 6.7 E.		28 22.1 E.		7 13.9 E.		20 18.9 E.		30 10.4

GREENWICH MEAN TIME.

DIONE.

d h	d h	d h	d h	d h	d h
Jan. 2 5.7 E.	Feb. 12 6.5 E.	Mar. 25 7.4 E.	May 5 8.6 E.	June 15 10.4 E.	Nov. 21 6.9 E.
4 23.4 E.	15 0.2 E.	28 1.0 E.	8 2.3 E.	18 4.1 E.	24 0.6 E.
7 17.0 E.	17 17.8 E.	30 18.7 E.	10 20.0 E.	20 21.8 E.	26 18.3 E.
10 10.7 E.	20 11.5 E.	Apr. 2 12.4 E.	13 13.7 E.	23 15.5 E.	29 12.0 E.
13 4.4 E.	23 5.1 E.	5 6.0 E.	16 7.4 E.	. . . .	Dec. 2 5.7 E.
15 22.0 E.	25 22.8 E.	7 23.7 E.	19 1.2 E.	. . . .	4 23.4 E.
18 15.7 E.	28 16.4 E.	10 17.4 E.	21 18.9 E.	Oct. 27 15.5 E.	7 17.1 E.
21 9.3 E.	Mar. 3 10.1 E.	13 11.1 E.	24 12.6 E.	30 9.2 E.	10 10.8 E.
24 3.0 E.	6 3.7 E.	16 4.8 E.	27 6.3 E.	Nov. 2 3.0 E.	13 4.5 E.
26 20.6 E.	8 21.4 E.	18 22.4 E.	30 0.0 E.	4 20.7 E.	15 22.2 E.
29 14.3 E.	11 15.0 E.	21 16.1 E.	June 1 17.7 E.	7 14.4 E.	18 15.9 E.
Feb. 1 7.9 E.	14 8.7 E.	24 9.8 E.	4 11.5 E.	10 8.1 E.	21 9.6 E.
4 1.6 E.	17 2.4 E.	27 3.5 E.	7 5.2 E.	13 1.8 E.	24 3.2 E.
6 19.2 E.	19 20.0 E.	29 21.2 E.	9 22.9 E.	15 19.5 E.	26 20.9 E.
9 12.9 E.	22 13.7 E.	May 2 14.9 E.	12 16.6 E.	18 13.2 E.	29 14.6 E.

RHEA.

d h	d h	d h	d h	d h	d h
Jan. 1 16.3 E.	Feb. 11 7.3 E.	Mar. 23 22.3 E.	May 3 13.9 E.	June 13 6.4 E.	Nov. 23 2.2 E.
6 4.6 E.	15 19.6 E.	28 10.6 E.	8 2.4 E.	17 18.9 E.	27 14.7 E.
10 16.9 E.	20 7.9 E.	Apr. 1 23.0 E.	12 14.8 E.	. . . .	Dec. 2 3.1 E.
15 5.3 E.	24 20.2 E.	6 11.4 E.	17 3.3 E.	. . . .	6 15.6 E.
19 17.6 E.	Mar. 1 8.6 E.	10 23.8 E.	21 15.8 E.	Oct. 31 11.7 E.	11 4.0 E.
24 6.0 E.	5 20.9 E.	15 12.2 E.	26 4.3 E.	Nov. 5 0.2 E.	15 16.5 E.
28 18.3 E.	10 9.2 E.	20 0.6 E.	30 16.8 E.	9 12.7 E.	20 4.9 E.
Feb. 2 6.6 E.	14 21.6 E.	24 13.0 E.	June 4 5.3 E.	14 1.2 E.	24 17.3 E.
6 19.0 E.	19 9.9 E.	29 1.5 E.	8 17.8 E.	18 13.7 E.	29 5.7 E.

TITAN.

d h	d h	d h	d h	d h	d h
Jan. 3 18.8 W.	Feb. 20 11.5 W.	Apr. 9 4.8 W.	May 27 1.8 W.	Oct. 18 5.9 W.	Dec. 5 5.2 W.
11 23.2 E.	28 16.0 E.	17 9.9 E.	June 4 7.5 E.	26 10.6 E.	13 9.2 E.
19 16.6 W.	Mar. 8 9.0 W.	25 3.4 W.	12 1.6 W.	Nov. 3 6.0 W.	21 4.2 W.
27 20.9 E.	16 13.6 E.	May 3 8.7 E.	20 7.4 E.	11 10.5 E.	29 7.9 E.
Feb. 4 14.1 W.	24 6.8 W.	11 2.4 W.	. . . .	19 5.8 W.	. . . .
12 18.5 E.	Apr. 1 11.6 E.	19 7.9 E.	. . . .	27 10.0 E.	. . . .

HYPERION.

d h	d h	d h	d h	d h	d h
Jan. 11 8.0 W.	Feb. 22 14.0 W.	Apr. 5 22.6 W.	May 18 12.5 W.	. . . .	Nov. 27 14.5 W.
21 19.8 E.	Mar. 5 1.8 E.	16 11.9 E.	29 5.0 E.	Oct. 26 23.8 E.	Dec. 8 22.1 E.
Feb. 1 11.0 W.	15 17.8 W.	27 4.9 W.	June 8 21.6 W.	Nov. 6 4.5 W.	18 23.4 W.
11 22.6 E.	26 6.1 E.	May 7 19.6 E.	19 16.0 E.	17 11.7 E.	30 6.9 E.

IAPETUS.

d h	d h	d h	d h	d h	d h
Jan. 20 8.4 I.	Feb. 27 14.3 S.	Apr. 8 15.7 I.	May 17 12.3 S.	Oct. 26 22.5 S.	Dec. 6 15.0 I.
Feb. 7 21.9 W.	Mar. 20 3.8 E.	27 10.7 W.	June 7 15.6 E.	Nov. 17 1.5 E.	25 14.5 W.

DIFFERENTIAL COORDINATES OF PHOEBE.

FOR GREENWICH MEAN NOON.

Date.	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$	Date.	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$	Date.	$\alpha_{Ph.}-\alpha_{Sat.}$	$\delta_{Ph.}-\delta_{Sat.}$
	m s	′ ″		m s	′ ″		m s	′ ″
n. 1	−1 11.5	+ 9 11	Apr. 15	−2 24.1	+12 26		. . . .	. . .
3	1 13.9	9 23	17	2 24.2	12 23		. . . .	. . .
5	1 16.3	9 34	19	2 24.2	12 20	Sept. 25	+0 20.0	− 3 49
7	1 18.6	9 45	21	2 24.2	12 16	27	0 23.2	4 8
9	1 21.0	9 56	23	2 24.1	12 13	29	0 26.4	4 26
11	−1 23.3	+10 6	25	−2 24.0	+12 9	Oct. 1	+0 29.5	− 4 45
13	1 25.6	10 16	27	2 23.8	12 6	3	0 32.6	5 3
15	1 27.8	10 26	29	2 23.5	12 2	5	0 35.6	5 21
17	1 30.0	10 36	May 1	2 23.2	11 57	7	0 38.6	5 39
19	1 32.2	10 45	3	2 22.8	11 53	9	0 41.6	5 57
21	−1 34.4	+10 54	5	−2 22.4	+11 48	11	+0 44.6	− 6 14
23	1 36.5	11 2	7	2 21.9	11 44	13	0 47.5	6 31
25	1 38.6	11 10	9	2 21.3	11 39	15	0 50.3	6 48
27	1 40.6	11 18	11	2 20.7	11 34	17	0 53.1	7 5
29	1 42.6	11 26	13	2 20.0	11 28	19	0 55.8	7 21
31	−1 44.6	+11 33	15	−2 19.3	+11 23	21	+0 58.5	− 7 36
b. 2	1 46.5	11 39	17	2 18.5	11 17	23	1 1.1	7 52
4	1 48.4	11 46	19	2 17.7	11 11	25	1 3.7	8 7
6	1 50.2	11 52	21	2 16.8	11 5	27	1 6.2	8 21
8	1 52.0	11 57	23	2 15.8	10 58	29	1 8.7	8 35
10	−1 53.7	+12 3	25	−2 14.8	+10 52	31	+1 11.0	− 8 48
12	1 55.4	12 8	27	2 13.7	10 45	Nov. 2	1 13.3	9 1
14	1 57.1	12 12	29	2 12.5	10 38	4	1 15.6	9 14
16	1 58.7	12 17	31	2 11.3	10 31	6	1 17.7	9 26
18	2 0.3	12 21	June 2	2 10.1	10 23	8	1 19.8	9 38
20	−2 1.8	+12 25	4	−2 8.8	+10 16	10	+1 21.8	− 9 49
22	2 3.3	12 28	6	2 7.4	10 8	12	1 23.7	9 59
24	2 4.7	12 31	8	2 5.9	10 0	14	1 25.6	10 9
26	2 6.1	12 34	10	2 4.4	9 51	16	1 27.3	10 18
28	2 7.4	12 36	12	2 2.9	9 42	18	1 29.0	10 27
r. 2	−2 8.7	+12 39	14	−2 1.3	+ 9 33	20	+1 30.6	−10 35
4	2 10.0	12 41	16	1 59.8	9 24	22	1 32.1	10 42
6	2 11.2	12 42	18	1 57.9	9 15	24	1 33.6	10 49
8	2 12.3	12 43	20	1 56.1	9 5	26	1 34.9	10 55
10	2 13.4	12 44	22	1 54.3	8 55	28	1 36.2	11 1
12	−2 14.5	+12 45	24	−1 52.4	+ 8 44	30	+1 37.3	−11 6
14	2 15.5	12 46	26	1 50.5	8 34	Dec. 2	1 38.4	11 10
16	2 16.4	12 46	28	1 48.5	8 23	4	1 39.4	11 14
18	2 17.3	12 46	30	1 46.4	8 12	6	1 40.3	11 17
20	2 18.1	12 46	July 2	1 44.3	8 0	8	1 41.1	11 19
22	−2 18.9	+12 46	4	−1 42.1	+ 7 49	10	+1 41.8	−11 21
24	2 19.6	12 45	6	1 39.9	7 37	12	1 42.4	11 22
26	2 20.3	12 45	8	1 37.6	7 24	14	1 43.0	11 23
28	2 20.9	12 44	10	1 35.3	7 12	16	1 43.5	11 23
30	2 21.5	12 43	12	1 33.0	6 59	18	1 43.8	11 22
r. 1	−2 22.0	+12 41	14	−1 30.6	+ 6 46	20	+1 44.1	−11 21
3	2 22.5	12 40	16	1 28.1	6 32	22	1 44.3	11 19
5	2 22.9	12 38	18	1 25.6	6 18	24	1 44.4	11 16
7	2 23.3	12 36	20	1 23.0	6 4	26	1 44.5	11 13
9	2 23.6	12 34	22	1 20.4	5 50	28	1 44.4	11 9
11	−2 23.8	+12 31	24	−1 17.7	+ 5 35	30	+1 44.3	−11 5
13	−2 24.0	+12 28	26	−1 15.0	+ 5 20	32	+1 44.0	−11 [illegible]

Position angle of satellite $p = p^1 + (P - P_0)$.

Apparent distance of satellite $s = F\frac{a(\rho)}{\rho}$.

Position angle of satellite $p = p' + (P - P_0)$.

Apparent distance of satellite $s = F\frac{a(\rho)}{\rho}$.

FOR MEAN

APPARENT ORBITS OF THE SATELLITES OF URANUS AT DATE OF OPPOSITION, AUGUST 23, 1919, AS SEEN IN AN INVERTING TELESCOPE.

South

Apparent Apsides.

Date.	Position Angle.	App. Distances.	
		Ariel.	Umbriel.
	°	"	"
May 13	347.5	13.1	18.3
Aug. 21	347.9	13.9	19.4
Nov. 29	348.4	13.1	18.3

Apparent Apsides.

Date.	Position Angle.	App. Distances.	
		Titania.	Oberon.
	°	"	"
May 13	347.5	30.0	40.1
Aug. 21	347.9	[illegible]	42.5
Nov. 29	[illegible]	30.0	40.1

North

GREENWICH MEAN TIME OF GREATEST ELONGATION.

ARIEL.		UMBRIEL.	
North.	South.	North.	South.
d h	d h	d h	d h
May 29 21.5	June 2 16.2	May 15 20 3	May 17 22.0
June 6 10.9	10 5 6	24 3.2	26 4.9
14 0.4	17 19 1	June 1 10.1	June 3 11.8
21 13.8	25 8 5	9 17 0	11 18.7
29 3.3	July 2 22 0	17 23 9	20 1.6
July 6 16 7	10 11 5	26 6.8	28 8 6
14 6 2	18 0 9	July 4 13 8	July 6 15.5
21 19.7	25 14.4	12 20.7	14 22.4
29 9 1	Aug. 2 3.8	21 3 6	23 5.3
Aug. 5 22 6	9 17.3	29 10 5	31 12.2
13 12 1	17 6.8	Aug. 6 17.4	Aug. 8 19.2
21 1.5	24 20.3	15 0.4	17 2.1
28 15 0	Sept. 1 9.7	23 7.3	25 9 0
Sept 5 4.5	8 23.2	31 14.2	Sept. 2 16.0
12 18 0	16 12.7	Sept. 8 21.2	10 22.9
20 7 4	24 2.2	17 4.1	19 5.8
27 20.9	Oct. 1 15.7	25 11.0	27 12.8
Oct. 5 10.4	9 5.1	Oct. 3 18.0	Oct. 5 19 7
12 23.9	16 18.6	12 0.9	14 2.7
20 13 4	24 8 1	20 7.9	22 9.6
28 2 9	31 21 6	28 14.8	30 16 5
Nov. 4 16.4	Nov. 8 11 1	Nov. 5 21.7	Nov. 7 23 5
12 5 8	16 0.6	14 4.7	16 6 4
19 19.3	23 14.0	22 11.6	24 13.4
27 8.8	Dec. 1 3.5	30 18 6	Dec. 2 20.3

TITANIA.		OBERON
North.	South.	North and South.
d h	d h	d h
May 9 17.2	May 14 1.6	June 8 9 9 N.
18 10.1	22 18.6	15 3.4 S.
27 3.0	31 11.5	21 21.0 N.
June 4 19.9	June 9 4.4	28 14 5 S.
13 12.8	17 21.3	July 5 8 1 N.
22 5.8	26 14.3	12 1 7 S.
30 22 7	July 5 7.2	18 19 2 N.
July 9 15 7	14 0.2	25 12.8 S.
18 8.6	22 17.1	Aug. 1 6 4 N.
27 1 6	31 10.0	8 0.0 S.
Aug. 4 18.5	Aug. 9 3.0	14 17 6 N.
13 11.5	17 20.0	21 11 2 S.
22 4 5	26 13.0	28 4 8 N.
30 21 4	Sept. 4 5.9	Sept. 3 22 4 S.
Sept. 8 14 4	12 22.9	10 16.0 N.
17 7.4	21 15.9	17 9.6 S.
26 0.4	30 8.8	24 3.2 N.
Oct. 4 17.4	Oct. 9 1.8	30 20.8 S.
13 10 3	17 18 8	Oct. 7 14.4 N.
22 3.3	26 11.8	14 8.0 S.
30 20.3	Nov. 4 4.7	21 1.6 N.
Nov. 8 13.2	12 21.7	27 19.1 S.
17 6.2	21 14.6	Nov. 3 12 7 N.
25 23.1	30 7.6	10 6.3 S.
Dec. 4 16.1	Dec. 9 0 5	16 23.8 N.

In the above diagram the central circle represents the planet.

For Ariel every third greatest elongation is given, and for Umbriel every alternate one; the intermediate ones may be found by adding multiples of the period of the satellite.

Sidereal period of Ariel, $2^d\ 12^h.489$; of Umbriel, $4^d\ 3^h.460$; of Titania, $8^d\ 16^h.941$; of Oberon, $13^d\ 11^h.118$.

Position angle of satellite $p = p^{1} + (P - P_{0})$.

Apparent distance of satellite $s = F\frac{a(\rho)}{\rho}$.

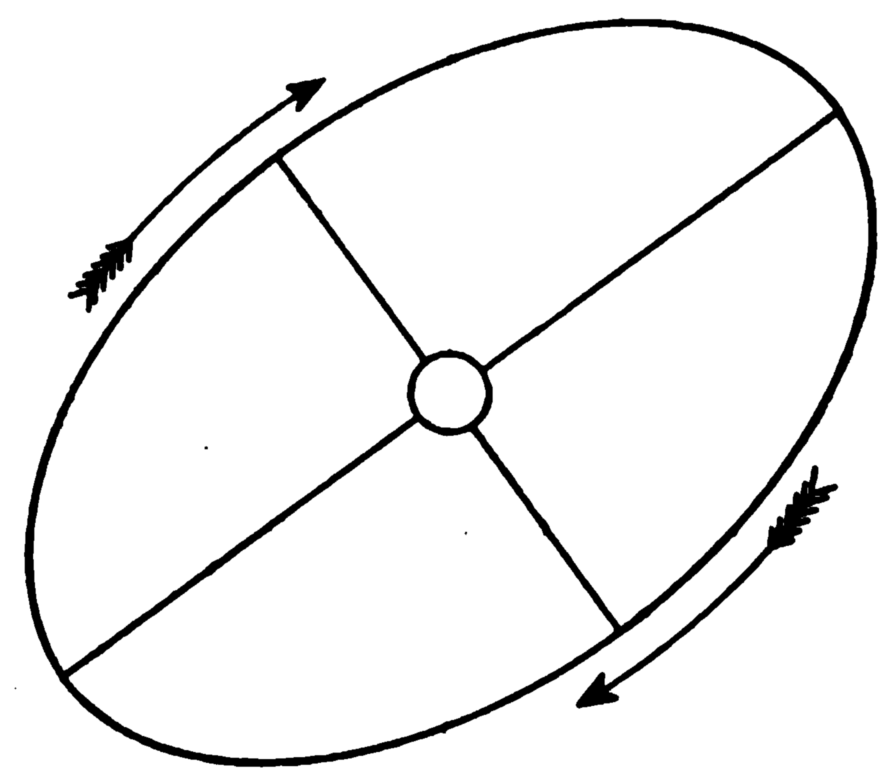
SATELLITE OF NEPTUNE, 1919.

Position angle of satellite $p = p' + (P - P_0)$.

Apparent distance of satellite $s = F\frac{a(\rho)}{\rho}$.

APPARENT ORBIT OF THE SATELLITE OF NEPTUNE AT DATE OF OPPOSITION, JANUARY 28, 1919, AS SEEN IN AN INVERTING TELESCOPE.

South



North

Date.	Position Angle of Apsis.	Apparent Distance at Apsis.
	°	″
Jan. 21	125.1	16.8
May 1	123.4	16.2
Oct. 12	128.2	16.0
Dec. 31	128.0	16.7

GREENWICH MEAN TIME OF GREATEST ELONGATION.

East.			West.			East.			West.			East.			West.		
	d	h		d	h		d	h		d	h		d	h		d	h
Jan.	6	12.7	Jan.	9	11.2	Mar.	29	20.3	Apr.	1	18.8	Oct.	15	13.8	Oct.	18	12.2
	12	9.8		15	8.3	Apr.	4	17.4		7	15.9		21	10.7		24	9.2
	18	6.9		21	5.5		10	14.4		13	13.0		27	7.7		30	6.2
	24	4.0		27	2.6		16	11.5		19	10.0	Nov.	2	4.8	Nov.	5	3.3
	30	1.2	Feb.	1	23.7		22	8.6		25	7.1		8	1.8		11	0.3
Feb.	4	22.3		7	20.8		28	5.6	May	1	4.1		13	22.8		16	21.3
	10	19.4		13	17.9	May	4	2.7		7	1.2		19	19.8		22	18.3
	16	16.5		19	15.1		9	23.7		12	22.2		25	16.9		28	15.4
	22	13.6		25	12.2		15	20.7		18	19.2	Dec.	1	13.9	Dec.	4	12.4
	28	10.8	Mar.	3	9.3		21	17.7		24	16.2		7	11.0		10	9.5
Mar.	6	7.9		9	6.4		27	14.7		30	13.2		13	8.0		16	6.6
	12	5.0		15	3.5	June	2	11.7	June	5	10.2		19	5.1		22	3.7
	18	2.1		21	0.6	. .	. .	. . .	. .	. .	. . .		25	2.2		28	0.8
	23	23.2		26	21.7	Oct.	9	16.8	Oct.	12	15.3		30	23.3		33	21.9

In the above diagram the central circle represents the planet.
The sidereal period of the satellite of Neptune is $5^d\ 21^h.044$.

MEAN TIME.

CONFIGURATIONS.

MEAN TIME.

CONFIGURATIONS.

July

Aug.

Sept.

Oct.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Metres).	Log ρ (including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
		° ′ ″	′ ″			h m s	s
1	Abbadia, France .	+43 22 52.2	−11 34.4	60	9.999317	+ 0 7 0.1	+ 1.15
2	.	−34 55 [illegible] a	+10 52.4	41 b	[illegible]	− 9 14 20.07 a	− 91.06
3	.	−34 55 37.4 c	[illegible]	. . .	[illegible]	− 9 14 20.17 c	− 91.06
4	.	+42 39 12.7 a	−11 33.1	70 a	9.999336	+ 4 55 7.12 a	[illegible]
5	.	+42 39 49.5 a	−11 33.1	52	9.999335	+ 4 54 59.97 a	[illegible]
6	. . .	+36 47 50	−11 6.7	342	9.999501	− 0 12 8.35	− 1.99
7	. . .	+40 28 58.1 d	−11 26.7	370 d	9.999411	+ 5 20 5.39 d	+ 52.56
8	. . .	+40 27 41.6	−11 26.6	. . .	9.999387	+ 5 20 2.08	+ 52.55
9	. . .	+42 21 56.5 e	−11 32.5	110 e	9.999348	+ 4 50 5.93 e	+ 47.66
10	Amherst, Mass. . . .	+42 22 17.1 f	−11 32.5	. . .	9.999338	+ 4 50 4.67 f	+ 47.65
11	. .	+42 16 48.7 a	−11 32.3	252 a	[illegible]	+ 5 34 55.37 a	+ 55.08
12	. .	+44 15 39.2 g	−11 35.4	242	9.999307	+ 5 53 35.98 g	[illegible]
13	. .	+43 45 14.4	−11 34.9	184	9.999316	− 0 45 1.30	− 7.40
14	. .	−16 22 28.0 h	+ 6 15.2	2451 h	0.000053	+ 4 46 11.75 h	+ 47.03
15	. .	+54 21 12.7 c	−10 50.6	61 c	9.999049	+ 0 26 35.4 c	+ 4.37
16	. .	+37 58 10.7 i	−11 14.3	107 i	9.999456	− 1 34 53 i	− 15.50
17	. .	+39 17 52.0 j	−11 21.5	36 j	9.999418	+ 5 6 20.1 j	+ 50.35
18	. .	+49 53 6.0 c	[illegible]	290 c	9.999167	− 0 42 35.57 c	− 7.16
19	. .	+41 25 18	−11 30.0	420	[illegible]	− 0 8 28.6	− 1.39
20	. .	+42 30 8.4	−11 32.8	. . .	[illegible]	+ 5 56 7.4	[illegible]
21	.	[illegible]	−11 6.1	85	[illegible]	− 0 40 57.74	− 6.73
22	. .	[illegible]	−11 13.7	97	[illegible]	+ 5 9 2.73	+ 50.34
23	. .	+52 30 16.7 k	−11 12.5	47 k	9.999085	− 0 53 34.89 k	− 8.80
24	Berlin, Prussia . . .	+52 31 13.1	−11 12.4	. . .	9.999081	− 0 53 34.41	− 8.80
25	Berlin, Prussia . . .	+52 31 30.7	−11 12.4	. . .	9.999081	− 0 53 27.40	− 8.78
26	Berlin, Prussia . . .	+52 29 7	−11 12.6	55	9.999084	− 0 53 54.2	− 8.86
27	Berne, Switzerland . .	+46 57 8.7	−11 34.2	573	[illegible]	− 0 29 45.70 a	− 4.89
28	. .	+47 14 59.0	−11 33.7	312	9.999235	− 0 23 57.12	− 3.93
29	.	+53 5 47	−11 8.7	56	9.999071	+ 0 31 40.9	+ 5.20
30	. .	+39 9 56 d	−11 20.8	238 d	[illegible]	+ 5 46 5 d	+ 56.85
31	. .	+ 4 35 55.2 c	− 1 50.8	2634	0.000170	+ 4 56 23.5	+ 48.69
32	, India	+18 53 36.2 c	− 7 5.1	14 c	[illegible]	− 4 51 15.72 c	− 47.85
33	. .	+50 43 45.0 k	−11 22.3	62 l	9.999130	− 0 28 23.17 k	− 4.66
34	), France	+44 50 7.2 a	−11 35.6	73	[illegible]	+ 0 2 5.51 a	+ 0.34
35	. .	+42 20 58 m	−11 32.5	31 m	9.999341	+ 4 44 19.1 m	+ 46.71
36	Boston, Mass. . . .	+42 21 32.5	−11 32.5	48	[illegible]	+ 4 44 15.0	+ 46.70
37	. .	+54 12 9.6 n	−11 0.8	32 n	9.999042	− 0 40 31.02 n	− 6.66
38	. .	+53 4 36	−11 8.8	. . .	[illegible]	− 0 35 15	− 5.79
39	Breslau, Prussia . . .	+51 6 55.8 k	−11 20.4	147 k	9.999126	− 1 8 8.72 k	− 11.20
40	Brisbane, Queensland .	−27 28 0.0	+ 9 28.3	. . .	9.999691	−10 12 6.17	[illegible]
41	gium	+50 47 55.5 a	−11 21.9	105 a	[illegible]	− 0 17 26.05 a	− 2.86
42	.	+50 51 10.6 c	−11 21.7	. . .	[illegible]	− 0 17 28.02 c	− 2.87
43	.	+47 29 34.7 c	−11 33.2	131 c	[illegible]	− 1 16 15.3 c	− 12.53
44	.	+52 12 51.6	−11 14.3	28	[illegible]	− 0 0 23.75	− 0.06
45	Cambridge, Mass. . .	+42 22 47.6 o	−11 32.6	24	[illegible]	+ 4 44 31.06 o	+ 46.74
46	. .	−33 56 3.5 p	+10 43.6	13 p	9.999548	− 1 13 54.76 p	− 12.14
47	. .	+39 8 8.9 q	−11 20.7	18 q	9.999421	− 0 33 14.9 q	− 5.46
48	. .	+37 30 13.2 c	−11 11.4	49 c	[illegible]	− 1 0 20.70 c	− 9.91
49	. .	+50 0 9.9 a	−11 25.5	138 r	9.999153	− 2 24 55.75 a	− 23.81
50	a. . .	+38 2 1.2 c	−11 14.6	259 c	9.999465	+ 5 14 5.83 c	+ 51.60

No.	Authority for— Latitude.	Authority for— Longitude.	Description.
1	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Obs. Paris Acad. of Sci., Hendaye.
2	Letter from Govt. Astronomer, 1913.	Letter from Govt. Astronomer, 1913.	Govt. Obs., since 1884.
3	Letter from Govt. Astronomer, 1913.	Letter from Govt. Astronomer, 1913.	Govt. Obs., before 1884.
4	Letter from Director, 1913.	Letter from Director, 1913.	Dudley Obs., since 1893.
5	Letter from Director, 1913.	Letter from Director, 1913.	Dudley Obs., before 1893.
6	*Les Obs. Astron.*, Bruxelles, 1907.	*Astron. Nach.*, Nr. 3993, 1905.	At Bouzaréah. Old Obs. 3′.8 S., 8s E.
7	*Publications* of Obs., 1909.	*Publications* of Obs., 1909.	[a] Obs. Western Univ. of Pa., since 1905.
8	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Western Univ. of Pa., before 1905.
9	Letter from Director, 1913.	Letter from Director, 1913.	Amherst College Obs., since 1903.
10	Letter from Director, 1913.	Letter from Director, 1913.	Lawrence Obs., before 1903.
11	*Publications* of Obs., 1915.	*Publications* of Obs., 1915.	Detroit Obs., Univ. of Mich.
12	See footnote ([b]).	See footnote ([b]).	Underwood Obs., Lawrence College.
13	*Pubbl. dell'Osserv.*, 1900.	*Astron. Nach.*, Nr. 3993, 1905.	Royal Observatory.
14	*Harvard Annals*, 1903.	*Harvard Annals*, 1903.	Branch of Harvard Coll. Obs.
15	*Armagh Catalogue of Stars*, 1840.	*Armagh Catalogue of Stars*, 1840.	Armagh Observatory.
16	*Annales de l'Obs.*, 1910.	Letter from Director, 1913.	[c] National Observatory.
17	Letter from Director, 1913.	Letter from Director, 1913.	Johns Hopkins Univ. Obs.
18	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Remeis Observatory.
19	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Fabra Obs., Acad. of Sci. and Arts.
20	Letter from Director, 1897.	Letter from Director, 1897.	Smith Obs., Beloit College.
21	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Hamburg Obs., since 1909.
22	Letter from Director, 1897.	Letter from Director, 1897.	Students' Obs., Univ. of Cal.
23	*Astron. Nach.*, Nr. 3545, 1898.	*Astron. Nach.*, Nr. 3993, 1905.	Royal Obs., since 1835.
24	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs., before 1835.
25	*Astron. Nach.*, Nr. 3170, 1893.	*Astron. Nach.*, Nr. 3170, 1893.	Urania Observatory.
26	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Treptow Observatory.
27	*Berliner Jahrbuch.*	*Astron. Nach.*, Nr. 3202, 1893.	Observatory, Cantonal Univ.
28	*Astron. Nach.*, Nr. 2805, 1887.	*Astron. Nach.*, Nr. 2805, 1887.	National Observatory.
29	British *Nautical Almanac.*	British *Nautical Almanac.*	Private Obs. of Earl of Rosse.
30	Letter from Director, 1913.	Letter from Director, 1913.	Kirkwood Obs., Univ. of Ind.
31	Letter from Director, 1913.	Letter from Director, 1913.	National Observatory.
32	Letter from Director, 1913.	Letter from Director, 1913.	Government Observatory.
33	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Royal Observatory.
34	Letter from Director, 1897.	*Annales de l'Obs.*, 1885.	Obs., Univ. of Bordeaux.
35	Letter from Director, 1909.	Letter from Director, 1909.	Boston Univ. Obs., since 1908.
36	Letter from Director, 1895.	Letter from Director, 1895.	Boston Univ. Obs., before 1908.
37	*Beob. zu Bothkamp*, 1872.	Letter from Director, 1913.	Obs. of Herr von Bülow.
38	*Astron. Nach.*, Nr. 15, 1822.	*Astron. Nach.*, Nr. 15, 1822.	Formerly Olber's Obs.
39	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3993, 1905.	Royal University Obs.
40	British *Nautical Almanac.*	[e] British *Nautical Almanac.*	Brisbane Observatory.
41	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs., since 1891.
42	*Annales de l'Obs.*, 1857.	Letter from Director, 1913.	Royal Obs., before 1891.
43	*Astron. Nach.*, Nr. 2752, 1886.	*Astron. Nach.*, Nr. 2752, 1886.	University Observatory.
44	Letter from Director, 1879.	Letter from Director, 1879.	University Observatory.
45	*Harvard Annals*, 1887.	*U. S. C. and G. S. Report*, 1897.	Harvard College Obs.
46	*Cape Gen. Catalogue of Stars*, 1885.	*Monthly Notices, R. A. S.*, Nov. 1908.	Royal Observatory.
47	See footnote ([d]).	Letter from Director, 1913.	International Lat. Obs.
48	Letter from Director, 1913.	Letter from Director, 1913.	Royal Obs. of Catania and Etna.
49	*Annales de l'Obs.*, 1904.	*Annales de l'Obs.*, 1904.	University Observatory.
50	Letter from Director, 1913.	Letter from Director, 1913.	Leander McCormick Obs., Univ. Va.

[a] Name of Western Univ. of Pa. changed in 1908; now the Univ. of Pittsburgh.
[b] *Professional Papers, Corps of Engineers, U. S. A.*, 1882.
[c] Old meridian circle 0″.4 S., 0s.1 W. of Cercle Syngros.
[d] *Resultate des Internationalen Breitendienstes*, 1900-1908.
[e] With the new value of the longitude of Sydney.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log ρ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
		° ′ ″	′ ″			h m s	s
51	Chicago, Ill.	+41 50 1.0	−11 31.2	. . .	9.999852	+5 50 26.84	+57.57
52	Christiania, Norway	+59 54 44.0 [a]	−10 4.6	25 [a]	9.998906	−0 42 53.50 [a]	− 7.05
53	Cincinnati, Ohio	+39 8 19.8 [b]	−11 20.7	247 [b]	9.999437	+5 37 41.40 [b]	+55.48
54	Cincinnati, Ohio	+39 6 26.5	−11 20.5	. . .	9.999421	+5 37 59.00	+55.52
55	Cleveland, Ohio	+41 30 14.5 [c]	−11 30.2	215 [c]	9.999375	+5 26 25.86 [c]	[illegible]
56	Clinton, N. Y.	+43 3 17.0	−11 33.9	276	9.999340	+5 1 37.45	+49.55
57		+40 12 24.5	−11 25.6	99	9.999400	+0 33 43.1	+ 5.54
58		+38 56 51.7 [d]	−11 19.7	[illegible]	9.999440	+6 9 18.33 [d]	[illegible]
59	Columbus, Ohio	+39 59 50.4 [d]	−11 24.7	233 [d]	9.999414	+5 32 2.60 [d]	+54.55
60	Denmark	+55 41 12.6	−10 48.6	14	9.999006	−0 50 18.69 [f]	− 8.26
61	ep.	−31 25 15.5 [g]	+10 18.0	434 [g]	9.999634	+4 16 48.22 [g]	+42.19
62		+50 3 52.0 [a]	−11 25.2	221 [a]	[illegible]	−1 19 50.27 [a]	−13.12
63		+54 21 18.0	−10 59.6	3	9.999036	−1 14 39.6	−12.26
64		+30 18 51.8 [h]	−10 5.3	681 [h]	[illegible]	−5 12 11.76 [h]	−51.29
65		+39 40 36.4 [a]	−11 23.3	1644 [i]	9.999516	+6 59 47.72 [a]	[illegible]
66		+41 36 0	−11 30.5	296	9.999378	+6 14 30.56	[illegible]
67	ssia	+58 22 47.2 [a]	−10 22.1	67 [a]	9.998945	−1 46 53.22 [a]	−17.56
[illegible]		+51 2 16.8	−11 20.8	121	[illegible]	−0 54 54.74	− 9.02
69		+53 23 13.1 [a]	−11 6.7	[illegible]	[illegible]	+0 25 21.1 [a]	+ 4.16
70		+57 9 36	−10 34.8	141	9.998979	+0 9 40.0	+ 1.59
71		+54 46 6.2 [j]	−10 56.4	107 [k]	9.999033	+0 6 19.75 [j]	+ 1.04
72	Dusseldor	+51 12 25.0 [l]	−11 19.9	46 [l]	9.999117	−0 27 2.69 [l]	− 4.44
[illegible]	Edinburgh, Scotland	+55 55 30.0 [a]	−10 46.5	134 [m]	9.999007	+0 12 44.22 [a]	+ 2.09
74	Edinburgh, Scotland	+55 57 23.2 [n]	−10 46.2	106 [o]	[illegible]	+0 12 43.05 [n]	+ 2.09
75	Elmira, N. Y.	+42 6 25	−11 31.9	. . .	[illegible]	+5 7 13.90	+50.47
76	Evanston, Ill.	+42 3 33.4	−11 31.8	175	[illegible]	+5 50 42.3	+57.61
77		+35 12 30.5	−10 54.7	2210	9.999667	+7 26 44.58	+73.39
78		+39 8 13.2 [r]	−11 20.7	165	9.999431	+5 8 47.73	+50.73
79		+42 52 46.2	−11 33.6	152	[illegible]	+5 8 1.00	+50.60
80	Geneva, Switzerland	+46 11 59.3 [a]	−11 35.2	407 [a]	9.999268	−0 24 36.61 [a]	− 4.04
81	Genoa, Italy	+44 25 9.3 [a]	−11 35.5	[illegible]	[illegible]	−0 35 41.28 [a]	− 5.86
82	Georgetown, D. C.	+38 54 26.7 [b]	−11 19.5	47	[illegible]	+5 8 18.26 [b]	+50.65
83	Glasgow, Mo.	+39 13 45.6	−11 21.1	227	9.999433	+6 11 18.08	+61.00
84	Glasgow, Scotland	+55 52 42.8 [a]	−10 46.9	55 [p]	[illegible]	+0 17 10.55 [a]	+ 2.82
85	Gotha, Germany	+50 56 37.9 [l]	−11 21.2	322 [a]	[illegible]	−0 42 50.51 [l]	− 7.04
86	Gotha, Germany	+50 56 4 4 [j]	−11 21.2	360 [j]	[illegible]	−0 42 55.09 [j]	− 7.05
87		+51 31 48.1 [q]	−11 18.2	161 [q]	[illegible]	−0 39 46.22 [q]	− 6.53
88		+39 38 46.6 [a]	−11 23.1	262 [a]	[illegible]	+5 47 24.36 [a]	+57.07
89	[illegible]	+51 28 38.2 [a]	−11 18.5	[illegible]	[illegible]	0 0 0.00 [a]	[illegible]
90	Hamburg, Germany	+53 33 6.0	−11 5.6	25	9.999057	−0 39 53.60 [a]	− 6.55
91	Ham ermany	+53 32 51 3 [d]	−11 5 6	30 [d]	[illegible]	−0 39 53.46 [d]	− 6.55
92		+43 42 15.3	−11 34.8	183	9.999317	+4 49 8.02	+47.50
93	[illegible]	+40 0 40.1 [r]	−11 24.8	. . .	[illegible]	+5 1 12.70 [r]	+49.48
94	Heidelberg, Baden	+49 23 55.2 [s]	−11 27.8	567 [s]	[illegible]	−0 34 53.13 [s]	− 5.73
95	Heidelberg, Baden	+49 23 55.7 [t]	−11 27.8	570 [t]	[illegible]	−0 34 52.96 [t]	− 5.73
96	Heidelberg, Baden	+49 24 34.3 [l]	−11 27.8	126 [l]	9.999168	−0 34 46.80 [l]	− 5.71
97	Helsingfors, Finland	+60 9 42.3 [a]	−10 1.5	33 [a]	[illegible]	−1 39 49.10 [a]	−16.40
98	Herény, Hungary	+47 15 47 4	−11 33.7	229	[illegible]	−1 6 24.7	−10.91
99	Hong Kong, China	+22 18 13 2 [j]	− 8 7.4	33 [j]	9.999793	−7 36 41.86 [j]	−75.01
100	Iowa City, Iowa	+41 40 0	−11 30 7	183	9.999369	+6 6 6	+60.14

ark.

[a] Floor of main building.
[b] Floor of meridian circle room.
[g] Position of meridian circle before 1888.
[r] Zenith telescope.
[s] Repsold meridian circle.
[t] Bruce telescope.

No.	Authority for— Latitude.	Authority for— Longitude.	Description.
51	U. S. Lake Survey, 1864.	Smithsonian *Report*, 1886.	[a] Dearborn Observatory.
52	*Astron. Nach.*, Nr. 3193, 1893.	*Astron. Nach.*, Nr. 3993, 1905.	University Observatory.
53	*Publications* of the Obs., 1908.	*Astronomical Journal*, 1897.	Cincinnati Obs., since 1873.
54	Letter from Director, 1897.	*Astronomical Journal*, 1854.	Cincinnati Obs., before 1873.
55	Letter from Director, 1913.	Letter from Director, 1913.	Case Obs., Case School of Appl'd Sci.
56	*Astron. Nach.*, Nr. 2553, 1883.	*Astron. Nach.*, Nr. 2553, 1883.	Litchfield Obs., Hamilton College.
57	*Eph. Astron. de Coimbra*, 1889.	*Eph. Astron. de Coimbra*, 1889.	University Observatory.
58	*Trans. Acad. of Sci. of St. Louis*, 1894.	*Trans. Acad. of Sci. of St. Louis*, 1894.	Laws Obs., Univ. of Mo.
59	Letter from Director, 1913.	Letter from Director, 1899.	McMillin Obs., State Univ.
60	British *Nautical Almanac*.	*Astron. Nach.*, Nr. 3993, 1905.	University Observatory.
61	*Resultados del Obs.*, 1887.	*Resultados del Obs.*, 1887.	National Observatory.
62	Letter from Director, 1913.	Letter from Director, 1913.	Imperial and Royal Obs.
63	Letter from Director, 1897.	Letter from Director, 1897.	Obs. of the School of Navigation.
64	*Great Trig. Survey of India*, 1908.	Letter from Supt. of Survey, 1913.	Haig Obs., Trig. Survey of India.
65	Letter from Director, 1913.	Letter from Director, 1913.	Chamberlin Obs., Univ. of Denver.
66	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Drake Univ. Obs.
67	*Publikationen der Sternw.*, 1911.	*Astron. Nach.*, Nr. 3993, 1905.	Imperial University Obs.
68	*Berliner Jahrbuch*.	*Berliner Jahrbuch*.	[b] Baron Engelhardt's Obs.
69	*Trans. Royal Dublin Soc.*, 1889.	*Trans. Royal Irish Acad.*, 1838.	Dunsink Obs., Trinity College.
70	Letter from Royal Astronomer, 1897.	Letter from Royal Astronomer, 1897.	[c] Lord Crawford's Obs.
71	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
72	*Astron. Nach.*, Nr. 643, 1848.	Letter from Director, 1913.	Municipal Obs., Bilk.
73	*Monthly Notices, R. A. S.*, 1907.	Letter from Director, 1913.	Royal Obs. since 1895; Blackford Hill.
74	*Monthly Notices, R. A. S.*, 1886.	*Edinburgh Observations*, 1858.	[d] Royal Obs. before 1895; Calton Hill.
75	Letter from Director, 1912.	Letter from Director, 1912.	Elmira College Obs.
76	Letter from Director, 1893.	Letter from Director, 1893.	Dearborn Obs., North Western Univ.
77	British *Nautical Almanac*.	British *Nautical Almanac*.	Lowell Observatory.
78	See footnote (j).	See footnote (k).	International Lat. Obs.
79	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Smith Observatory.
80	*Memoire* par J. Pidoux, 1900.	*Astron. Nach.*, Nr. 3993, 1905.	Municipal Observatory.
81	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3993, 1905.	Hydrographic Institute.
82	See footnote (e).	See footnote (e).	Georgetown College Obs.
83	*Astron. Nach.*, Nr. 2625, 1884.	*Washington Observations*, 1877.	Morrison Observatory.
84	*First Glasgow Catalogue*, 1870.	*Monthly Notices, R. A. S.*, 1865.	University Observatory.
85	Letter from Director, 1913.	Letter from Director, 1913.	Ducal Obs. since 1857.
86	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Ducal Obs. before 1857.
87	*Astron. Nach.*, Nr. 4428, 1910.	*Astron. Nach.*. Nr. 3993, 1905.	Royal University Obs.
88	Letter from Director, 1912.	Letter from Director, 1912.	McKim Obs., De Pauw Univ.
89	*Greenwich Observations*, 1910.	*Greenwich Observations*, 1910.	[f] Royal Observatory.
90	Letter, Director new Obs., 1913.	*Astron. Nach.*, Nr. 3993, 1905.	[g] Hamburg Observatory before 1909.
91	Letter from Director, 1913.	Letter from Director, 1913.	[h] Imperial Marine Obs.
92	Letter from Director, 1894.	Letter from Director, 1894.	Shattuck Obs., Dartmouth College.
93	*Proc. Amer. Ph. Soc.*, 1883.	*Proc. Amer. Ph. Soc.*, 1883.	Haverford College Obs.
94	Letter from Director, 1913.	Letter from Director, 1913.	Astron. Institute, Königstuhl Obs.
95	*Publik. des Obs., Königstuhl*, 1902.	*Publik. des Obs., Königstuhl*, 1902.	Astrophys. Inst., Königstuhl Obs.
96	*Publik. des Obs., Königstuhl*, 1902.	*Publik. des Obs., Königstuhl*, 1902.	[i] Dr. Wolf's Obs. before 1898.
97	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Imperial Univ. Obs.
98	*Astron. Nach.*, Nr. 2633, 1884.	British *Nautical Almanac*.	Astrophysical Observatory.
99	*Hong Kong Observations*, 1897.	Letter from Director, 1897.	Colonial Observatory.
100	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Obs., Univ. of Iowa.

[a] Transferred to Evanston, Ill., in 1887.
[b] Instruments transferred to Univ. of Kasan in 1897.
[c] Instruments transferred to Royal Obs. at Edinburgh in 1896.
[d] City Obs. since 1896.
[e] Based upon data from the U. S. C. and G. Survey.
[f] Point of reference before 1851, 7½ ft. N., 19 ft. W.
[g] At Bergedorf since 1909.
[h] Transit instrument before 1908, 0″.5 N., 0s.04 W.
[i] Instruments transferred to the Astrophysical Institute of the Königstuhl Obs. in 1898.
[j] *Resultate des Internationalen Breitendienstes*, 1900–1908.
[k] *Resultate des Internationalen Breitendienstes*, Band I, 1903.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (*Meters*).	Log ρ (*Including altitude*).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
		° ′ ″	′ ″			h m s	s
101	Ithaca, N. Y.	+42 26 47.3 a	−11 32.6	256 a	9.999354	+5 5 55.99 a	+50.26
102	Ithaca, N. Y.	+42 26 51.4	−11 32.6	. . .	9.999337	+5 5 56.47	+50.26
103	Jamaica, West Indies .	+18 24 51 b	− 6 55.9	540 b	9.999892	+5 11 29.48 b	+51.17
104	Jena, Saxe-Weimar . .	+50 55 34.9 c	−11 21.3	165 c	9.999132	−0 46 20.22 c	− 7.61
105	Jena, Saxe-Weimar . .	+50 55 35.8	−11 21.3	155	9.999131	−0 46 20.31	− 7.61
106	Jena, Saxe-Weimar . .	+50 56 11.0	−11 21.3	174	9.999132	−0 46 20.73	− 7.61
107	Johannesburg, Transvaal	−26 10 54.6 d	+ 9 9.8	1804 d	9.999840	−1 52 18.0 d	−18.45
108	Kalocsa, Hungary . .	+46 31 41.7 b	−11 34.8	117 e	9.999240	−1 15 54.12 b	−12.47
109	Kasan, Russia . . .	+55 50 20.0 f	−10 47.3	98 f	9.999007	−3 15 15.61 f	−32.08
110	Kasan, Russia . . .	+55 47 23.9 g	−10 47.7	79 g	9.999007	−3 16 29.00 g	−32.28
111	Kew, England . . .	+51 28 6	−11 18.5	10	9.999108	+0 1 15.1	+ 0.21
112	Kief, Russia	+50 27 10.0 w	−11 23.5	179 f	9.999145	−2 2 0.56 f	−20.04
113	Kiel, Prussia	+54 20 27.6 f	−10 59.7	52 f	9.999040	−0 40 35.45 f	− 6.67
114	Kis-Kartal, Hungary .	+47 41 54.8	−11 32.8	. . .	9.999202	−1 18 11.7	−12.85
115	Konigsberg, Prussia .	+54 42 50.5 f	−10 56.8	24 f	9.999029	−1 21 58.97 f	−13.47
116	Kremsmunster, Austria	+48 3 23.1 f	−11 32.0	384 f	9.999220	−0 56 31.58 f	− 9.29
117	La Plata, Arg. Rep. .	−34 54 31.8 h	+10 52.2	18 h	9.999525	+3 51 44.8 h	+38.07
118	Leiden, Netherlands .	+52 9 19.8 f	−11 14.6	6 f	9.999090	−0 17 56.15 f	− 2.95
119	Leipzig, Saxony . . .	+51 20 5.9 i	−11 19.2	119 i	9.999118	−0 49 33.92 i	− 8.14
120	Leipzig, Saxony . . .	+51 20 20.1	−11 19.2	. . .	9.999110	−0 49 29.92	− 8.13
121	Liege, Belgium . . .	+50 37 6	−11 22.8	127	9.999137	−0 22 15.44	− 3.66
122	Lisbon(Tapada), Portugal	+38 42 30.5 j	−11 18.5	95 j	9.999437	+0 36 44.68 j	+ 6.04
123	Liverpool, England . .	+53 24 4.8	−11 6.6	61	9.999064	+0 12 17.33	+ 2.02
124	Liverpool, England . .	+53 24 47.8	−11 6.5	. . .	9.999059	+0 12 0.11	+ 1.97
125	Lund, Sweden . . .	+55 41 51.6 i	−10 48.5	38	9.999006	−0 52 44.97 i	− 8.67
126	Lund, Sweden . . .	+55 52 12.0	−10 47.0	. . .	9.999000	−0 52 47.50	− 8.67
127	Lussinpiccolo, Austria .	+44 32 11.0	−11 35.5	42	9.999286	−0 57 52.41	− 9.51
128	Lyons, France . . .	+45 41 41.0	−11 35.5	299	9.999274	−0 19 8.52 k	− 3.14
129	Madison, Wis. . .	+43 4 36.8 f	−11 33.9	292 l	9.999340	+5 57 37.90 f	+58.75
130	Madras, India . . .	+13 4 8.0 f	− 5 5.5	7	9.999926	−5 20 59.14	−52.73
131	Madrid, Spain . . .	+40 24 30.0 m	−11 26.4	655 m	9.999433	+0 14 45.09 m	+ 2.42
132	Manila, P. I.	+14 34 41	− 5 38.2	3	9.999908	−8 3 54.2	−79.48
133	Mare Island, Cal. . .	+38 5 55.8 n	−11 15.0	18 n	9.999447	+8 9 5.63 n	+80.35
134	Markree, Ireland . .	+54 10 31.8	−11 1.0	45	9.999044	+0 33 48.4	+ 5.55
135	Marseilles, France . .	+43 18 19 f	−11 34.3	75 o	9.999320	−0 21 34.55 f	− 3.54
136	Marseilles, France . .	+43 17 52	−11 34.3	27	9.999317	−0 21 28.1	− 3.53
137	Mauritius (Port Louis) .	−20 5 39	+ 7 27.7	54	9.999832	−3 50 12.6	−37.82
138	Melbourne, Victoria .	−37 49 53.2 p	+11 13.4	28 q	9.999454	−9 39 53.92 p	−95.26
139	Meudon, France . . .	+48 48 18	−11 29.8	162	9.999185	−0 8 55.6	− 1.47
140	Middletown, Conn. . .	+41 33 16.0	−11 30.4	. . .	9.999359	+4 50 37.18	+47.74
141	Milan, Italy	+45 27 59.3	−11 35.6	120	9.999268	−0 36 45.88 g	− 6.04
142	Minneapolis, Minn. . .	+44 58 40.0 r	−11 35.7	260 r	9.999290	+6 12 57.04 r	+61.27
143	Mizusawa, Japan . .	+39 8 3.6 x	−11 20.7	62	9.999424	−9 24 30.75	−92.74
144	Modena, Italy . . .	+44 38 51.4	−11 35.6	64	9.999285	−0 43 43.40	− 7.18
145	Montreal, Canada . .	+45 30 20 s	−11 35.6	57 s	9.999262	+4 54 18.63 s	+48.35
146	Moscow (Presnia), Russia	+55 45 19.5	−10 48.0	150 f	9.999012	−2 30 17.03 f	−24.69
147	Mount Hamilton, Cal. .	+37 20 25.6 r	−11 10.4	1284 r	9.999552	+8 6 34.89 r	+79.93
148	Mount Wilson, Cal. . .	+34 12 59.5 t	−10 46.2	1799 t	9.999663	+7 52 14.33 t	+77.58
149	Mount Wilson, Cal. . .	+34 12 55	−10 46.1	1727 u	9.999658	+7 52 14.3	+77.58
150	Munich, Bavaria . .	+48 8 45.5 v	−11 31.7	529 v	9.999227	−0 46 26.02 r	− 7.63

a Top of east pier in transit room.
b Transit instrument pier.
c Bamberg equatorial.
d International latitude hut.
e *Seven-inch equatorial.*
f *Meridian circle.*
g *Center of great dome.*
h *Gautier meridian circle.*
i *Center of observatory.*

j Center of dome.
k Pier of small meridian circle.
l Main floor.
m Center of rotunda.
n East transit instrument.
o Barometer.
p Old meridian circle.
q Floor of meridian room.

r Transit instrument.
s East transit pier.
t Snow telescope pier.
u Floor.
v West dome.
w Photographic equatorial, 41 feet south of prime vertical transit.
x Zenith telescope.

No.	Authority for— Latitude.	Authority for— Longitude.	Description.
101	Letter from the Dean, 1913.	Letter from the Dean, 1913.	[a] Fuertes Obs., Cornell Univ.
102	Letter from the Dean, 1913.	Letter from the Dean, 1913.	[b] Fuertes Obs., Cornell Univ.
103	*Memoirs, R. A. S.*, 1879.	See footnote ([c]).	Mr. Hall's Obs., Montego Bay.
104	Letter from Director, 1913.	Letter from Director, 1913.	Univ. Obs., since 1888.
105	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Univ. Obs., before 1888.
106	*V. J. S. Astron. Gesell.*, 1910.	*V. J. S. Astron. Gesell.*, 1910.	The late Dr. Winkler's Obs.
107	Transvaal Obs. *Circular*, 1910.	Transvaal Obs. *Circular*, 1910.	Union Obs., formerly Transvaal Obs.
108	Letter from Director, 1913.	Letter from Director, 1913.	Archiepiscopal Haynald Obs.
109	Letter from Director, 1913.	Publications of the Obs., 1911.	Englehardt Obs., Univ. of Kasan.
110	Publications of the Obs., 1911.	Letter from Director, 1913.	University Observatory.
111	Letter from Director, 1897.	Letter from Director, 1897.	Meteorological Obs., London.
112	*Annales de l' Obs.*, Vol. IV, 1893.	*Astron. Nach.*, Nr. 3993, 1905.	Imperial Univ. Obs.
113	*Les Obs. Astron.*, Bruxelles, 1907.	*Astron. Nach.*, Nr. 3993, 1905.	[d] Royal University Obs.
114	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Near Aszòd, Hungary.
115	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Royal University Obs.
116	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3993, 1905.	Obs. of the Benedictines.
117	Letter from Director, 1913.	Letter from Director, 1913.	National Univ. Obs.
118	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	University Observatory.
119	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	University Obs., since 1861.
120	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	University Obs., before 1861.
121	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	University Obs., Cointe.
122	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3202, 1893.	Obs. of Lisbon.
123	*Monthly Notices, R. A. S.*, 1894.	*Monthly Notices, R. A. S.*, 1894.	Bidston, Birkenhead, since 1867.
124	British *Nautical Almanac*, 1872.	British *Nautical Almanac*, 1872.	Liverpool Obs., before 1867.
125	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905	Royal Univ. Obs., since 1867.
126	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	Royal Univ. Obs., before 1867.
127	Letter from Director, 1897.	Letter from Director, 1897.	Manora Observatory.
128	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3202, 1893.	Obs. of the Univ., St. Ganis Laval.
129	*Publications* of the Obs., 1892.	Letter from Director, 1912.	Washburn Obs., Univ. of Wis.
130	*Great Trig. Survey of India*, 1906.	*Great Trig. Survey of India*, 1901.	Obs. founded by East India Co.
131	*Annuario del Obs.*, 1912.	*Astron. Nach.*, Nr. 3993, 1905.	Astron. and Meteorolog. Obs.
132	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Meteorological Observatory.
133	Letter from Director, 1913.	*Lick Obs. Bulletin*, 1908.	Chronom. and Time Sta., Navy Yd.
134	*Astron. Nach.*, Nr. 758, 1851.	British *Nautical Almanac*, 1901.	Col. Cooper's Observatory.
135	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	See footnote ([e]).
136	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	See footnote ([f]).
137	Mag. and Meteor. *Results*, 1908.	Mag. and Meteor. *Results*, 1908.	Royal Alfred Obs.
138	*Astron. Results*, 1881–84.	[i] *Astron. Results*, 1881–84.	[g] Government Observatory.
139	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Seine-et-Oise, near Paris.
140	Letter from Director, 1894.	Letter from Director, 1894.	Wesleyan University Obs.
141	*Pubbl. del R. Osserv.*, 1914.	*Astron. Nach.*, Nr. 3993, 1905.	Royal Observatory, Brera.
142	Letter from Director, 1915.	Letter from Director, 1915.	Obs. Univ. of Minn.
143	See footnote ([h]).	*Les Obs. Astron.*, Bruxelles, 1907.	International Lat. Obs.
144	Letter from Director, 1913.	Letter from Director, 1913.	Royal Univ. Geophysical Obs.
145	Letter from Director, 1912.	*U. S. C. and G. S. Report*, 1897.	McGill University Obs.
146	*Les Obs. Astron.*, Bruxelles, 1907.	*Astron. Nach.*, Nr. 3993, 1905.	Obs. of the Imperial Univ.
147	*Publications* of the Obs., 1900.	*U. S. C. and G. S. Report*, 1897.	Lick Obs., Univ. of Cal.
148	*Astrophysical Journal*, 1906.	*Astrophysical Journal*, 1906.	Solar Obs., Carnegie Inst.
149	Letter from C. G. Abbot, 1912.	Letter from C. G. Abbot, 1912.	Branch of Smithson. Astrophys. Obs.
150	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3993, 1905.	Royal Observatory.

[a] Since 1902.
[b] Before 1902.
[c] *British Report on Transit of Venus*, 1882.
[d] Old position of meridian circle, 0″.9 N., 0ˢ.12 E.
[e] National Obs., Univ. of Aix-Marseilles, since 1864–66.
[f] National Obs., at Accoules, before 1864–66.
[g] Transferred from Williamstown in 1861.
[h] *Resultate des Internationalen Breitendienstes*, 1900–1908.
[i] With the new values of the longitudes of Adelaide and Sydney.

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (*Meters*).	Log ρ (*Including altitude*).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
		° ′ ″	′ ″			h m s	s
151		+40 51 46.3	−11 28.1	164	9.999388	−0 57 1.70 a	− 9.37
152		+36 8 54.4 b	−11 2.0	172 c	9 999505	+5 47 12.2	+57 04
153		+46 59 50.6	−11 34.1	488	9.999254	−0 27 49.90 d	− 4 57
154		+40 30 1.4 b	−11 26.7	21 b	[illegible]	+4 57 47.45 b	+48.92
155	New Haven, Conn. . .	+41 19 22.3	−11 29.6	40	9.999368	+4 51 40.58	+47.92
156	New Haven, Conn. . .	+41 18 36.5	−11 29.6	. . .	9.999365	+4 51 42.16	+47.92
157	New York, N. Y. . .	+40 48 34.6	−11 27.9	25	9.999380	+4 55 50	+48.60
158	New York, N. Y. . .	+40 45 23.1	−11 27.7	. . .	9.999379	+4 55 53.64	+48.61
159	. .	+43 43 16.9 e	−11 34.9	378	[illegible]	−0 29 12.15 e	− 4.80
160	. .	+46 58 22.1	−11 34.2	55	9.999225	−2 7 53.78 a	−21.01
161	.	+42 19 1.9 b	−11 32.4	70 b	[illegible]	+4 50 33.10 b	+47.73
162	. .	+44 27 41.6 f	−11 35.5	290 f	9.999305	+6 12 35.92 f	+61.21
163	. .	+37 48 5 d	−11 13.2	11 d	9.999454	+8 9 6.55 d	+80.35
164	. .	+46 28 37.5	−11 34.9	. . .	9.999254	−2 3 2.18 b	−20.21
165	Odessa, Russia . . .	+46 28 36.7 d	−11 34.9	55 d	9.999237	−2 3 2.04 d	−20.21
166	O-Gyalla, Hungary . .	+47 52 27.3	−11 32.4	113	9.999206	−1 12 45.49	−11.95
167	Omaha, Nebr. . . .	+41 16 5.6 b	−11 29.5	344 b	[illegible]	+6 23 46.96 b	+63.05
168	Orono, Me.	+44 54 0	−11 35.6	38	9.999277	+4 34 40.3	+45.12
169	Ottawa, Canada . . .	+45 23 39.1 d	−11 35.6	85 g	9.999207	+5 2 51.98 d	+49.75
170	Oxford, Miss. . . .	+34 22 12.6	−10 47.5	. . .	[illegible]	+5 58 7.18	+58.83
171	. .	+51 45 35.6 d	−11 16.9	65 h	9.999104	+0 5 2.6	+ 0.83
172	.	+51 45 34.2	−11 16.9	64	9.999104	+0 5 0.40	+ 0.82
173	. .	+45 24 1.0 i	−11 35.6	31 j	9.999263	−0 47 29.13 i	− 7.80
174	. . .	+38 6 44.0 k	−11 15.1	76 d	9.999451	−0 53 25.87	− 8 78
175	Paris, France	+48 50 11.2 l	−11 29.8	67 m	9.999178	−0 9 20.93 n	− 1.53
176	Perth, West Australia .	−31 57 8.9 d	+10 23.8	60	9.999597	−7 43 21.51 d	−76 12
177	. .	+39 58 2.1 o	−11 24.6	74 o	9 999404	+5 1 6.81 o	+49.46
178	. . .	+44 51 48.6 d	−11 35.6	32 d	9.999277	−0 55 23.07 d	− 9.10
179	. .	+52 22 56.0 p	−11 13.3	97 p	9.999091	−0 52 15 86 p	− 8.59
180	Y. .	+41 41 18	−11 30.8	61	9 999360	+4 55 33.6 b	+48.55
181	. .	+50 5 16 0 o	−11 25.1	197 o	9.999155	−0 57 40.28 o	− 9 47
182	. .	+40 20 55.8	−11 26.1	75	[illegible]	+4 58 39.44	+49 06
183	Princeton, N. J. . . .	+40 20 57.8 d	−11 26.1	65 d	[illegible]	+4 58 37.61 d	+49.06
184	Providence, R. I. . .	+41 50 21	−11 31.2	64	9.999356	+4 45 35.95	+46.92
185	Providence, R. I. . .	+41 49 46 4	−11 31.2	. . .	9.999352	+4 45 37.64	+46.92
186	. . .	+59 46 18.7 a	−10 6.2	75 q	9.999014	−2 1 18.57 a	−19 93
187	. .	+46 47 59.2	−11 34.4	90	9.999231	+4 44 52.71 b	+46.80
188	. .	− 0 14 0	+ 0 5.6	2908	0.000198	+5 14 6.66	+51 60
189	. . .	+56 57 9.3	−10 36.9	.	9 998974	−1 36 28.10 r	−15.65
190	Brazil	−22 54 23.8 o	+ 8 17.7	62 o	[illegible]	+2 52 41.4 o	+28.37
191	Rome, Italy	+41 53 53.6 d	−11 31.3	51 j	[illegible]	−0 49 55.12 d	− 8.20
192	Rome, Italy	+41 53 33.6 d	−11 31.3	65 q	9.999355	−0 49 56.34 d	− 8.20
193	Rome, Italy	+41 54 12.4 d	−11 31.4	100 d	9 999357	−0 49 48.02 d	− 8.18
194	Rome, Italy	+41 54 16.7	−11 31.4	75 j	[illegible]	−0 49 49.28 d	− 8.18
195	San Fernando, Spain .	+36 27 42.0 s	−11 4.3	30 s	9.999488	+0 24 49.32 s	+ 4.06
196	San Fernando, Spain .	+36 31 7	−11 4.7	. . .	9.999485	+0 25 10.82	+ 4.14
197	San Francisco, Cal. . .	+37 47 27.9	−11 13.2	. . .	9.999454	+8 9 42.86 t	+80.45
198	San Luis, Arg. Rep. .	−33 17 45.7	+10 37.6	800	9.999616	+4 25 22	+43.60
199	Santiago, Chile . . .	−33 26 42 d	+10 39.0	520 d	[illegible]	+4 42 46.0 d	+46.45
200	Santiago, Chile . . .	−33 26 25	+10 38.9	619	9.999600	+4 42 36.5	+46.42
201	Santiago, Chile . . .	−33 33 46 b	+10 40.1	580 b	9.999505	+4 42 46 b	+46.45

aps.
ill.

h Barometer basin.
i Axis of tower.
j Barometer.
k Center of south dome.
l South facade of observatory.
m Level of obs. terrace.
n Cassini's Meridian.

o
p ome.
q
r
s ground floor.
t

No.	Authority for— Latitude.	Longitude.	Description.
151	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3202, 1893.	Royal Obs., Capo di Monte.
152	Letter from the Dean, 1913.	Letter from Director, 1893.	Obs. of Vanderbilt Univ.
153	Swiss Triangulation, 1890.	*Astron. Nach.*, Nr. 3202, 1893.	Cantonal Observatory.
154	Letter from Director, 1913.	Letter from Director, 1913.	SchanckObs.,RutgersCollege.
155	Letter from Director, 1893.	See footnote ([h]).	Yale Univ. Obs., since 1882.
156	Letter, Director new Obs., 1893.	Letter, Director new Obs., 1893.	Yale Univ. Obs., before 1882.
157	*Contributions from the Obs.*, 1906.	*Contributions from the Obs.*, 1906.	Columbia Univ. Obs., since 1897.
158	Letter from Director, 1879.	British *Nautical Almanac*.	Columbia Univ. Obs., before 1897.
159	*Annales de l'Obs.*, Tome II, 1887.	*Astron. Nach.*, Nr. 3993, 1905.	Mt. Gros, near Nice.
160	*Les Obs. Astron.*, Bruxelles, 1907.	*Astron. Nach.*, Nr. 3202, 1893.	Naval Observatory.
161	Letter from Director, 1913.	Harvard *Annals*, 1893.	Smith College Obs.
162	Letter from Director, 1912.	*Publications* of Obs., 1901.	[a] Goodsell Obs., Carleton College.
163	Letter from Director, 1912.	Letter from Director, 1912.	Chabot Observatory.
164	Pulkowa *Mitteilungen*, No. 56, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Branch of Pulkowa Obs.
165	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3993, 1905.	University Observatory.
166	Letter from Director, 1897.	Letter from Director, 1897.	Royal Astrophysical Obs.
167	Letter from Director, 1912.	Letter from Director, 1912.	Creighton University Obs.
168	Letter from Director, 1912.	Letter from Director, 1912.	Obs. Univ. of Maine.
169	Letter from Chief Astronomer, 1913.	Letter from Chief Astronomer, 1913.	Dominion Astronomical Obs.
170	Smithsonian *Report*, 1880.	Smithsonian *Report*, 1880.	Obs. Univ. of Mississippi.
171	*Radcliffe Catalogue of Stars*, 1900.	*Radcliffe Observations*, 1842.	Radcliffe Observatory.
172	*Oxford Astron. Observations*, 1878.	*Oxford Astron. Observations*, 1878.	University Observatory.
173	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Royal University Obs.
174	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3202, 1893.	Royal Observatory.
175	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Observatory of Paris.
176	*Meridian Observations*, Vol. 2, 1908.	[i] *Meridian Observations*, Vol. 2, 1908.	Government Observatory.
177	Letter from Director, 1913.	Letter from Director, 1913.	Flower Obs., Univ. of Pa.
178	Letter from Director, 1913.	Letter from Director, 1913.	See footnote ([b]).
179	*Veröff. K. Preuss. Geol. Inst.*, 1905.	*Astron. Nach.*, Nr. 3993, 1905.	Royal Astrophysical Obs.
180	Smithsonian *Report*, 1880.	Smithsonian *Report*, 1880.	Vassar College Obs.
181	Prague *Observations*, 1907.	*Astron. Nach.*, Nr. 3993, 1905.	Imperial and Royal Obs.
182	Letter from Director, 1913.	Letter from Director, 1913.	Halsted Obs., Princeton Univ.
183	Letter from Director, 1913.	*Washington Observations*, 1878.	Obs. of Instruction, Princeton Univ.
184	Letter from Director, 1893.	Letter from Director, 1893.	Ladd Obs., Brown Univ.
185	*Astron. Nach.*, Nr. 2254, 1879.	*Astron. Nach.*, Nr. 2254, 1879.	Mr. Seagrave's Observatory.
186	*Description de l'Obs.*, 1845.	*Astron. Nach.*, Nr. 3993, 1905.	Obs. Central Nicolas.
187	Letter from Director, 1912.	Letter from Director, 1912.	Quebec Obs., Plains of Abraham.
188	Letter from Director, 1897.	Letter from Director, 1897.	National Observatory.
189	Letter from Director, 1897.	*Astron. Nach.*, Nr. 3993, 1905.	Polytechnic School Obs.
190	See footnote ([c]).	See footnote ([c]).	National Observatory.
191	*Memorie del R. Osserv.*, 1904.	Letter from Director, 1913.	Royal Obs. at Roman College.
192	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Royal Univ. Obs. at Capitol.
193	Letter from Director, 1913.	Letter from Director, 1913.	Vatican Obs., since 1906–7.
194	*Pubbl. della Specola Vaticana*, 1905.	*Astron. Nach.*, Nr. 3993, 1905.	[d] Vatican Obs., before 1906–7.
195	*Annales del Obs.*, 1892.	Letter from Director, 1913.	Naval Obs., since 1797.
196	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	[e] Naval Obs., before 1797.
197	Letter from Director, 1897.	*U. S. C. and G. S. Report*, 1897.	Davidson Observatory.
198	Letter from Director, 1911.	Letter from Director, 1911.	Southern Obs. of Carnegie Inst.
199	Letter from Director, 1913.	Letter from Director, 1913.	[f] National Obs., since 1862.
200	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	[g] National Obs., before 1862.
201	Letter from Director, 1913.	Letter from Director, 1913.	National Obs., Espejo.

[a] Old observatory, 1877–1886, 415 feet W.
[b] Observatory of Imperial and Royal Hydrographic Office.
[c] Green and Davis, *Telegraphic Determinations of Longitudes on the East Coast of South America*, 1880.
[d] In the Gregorian tower.
[e] In Cadiz.
[f] In Quinta Normal.
[g] On the hill Santa Lucia, in Sanitago.
[h] *Based upon data from the U. S. C. and G. Survey.*
[i] *With the new value of the longitude of Sydney.*

No.	Place.	Latitude.	Reduction to Geocentric Latitude.	Altitude (Meters).	Log ρ (Including altitude).	Longitude from Greenwich.	Reduction from Greenwich to Local S.T.M.N.
		° ′ ″	′ ″			h m s	s
202	South Bethlehem, Pa. .	+40 36 23.2 [a]	−11 27.2	110	9.999391	+ 5 1 31.96 [a]	+ 49.53
203	South Hadley, Mass. .	+42 15 18.2 [b]	−11 32.2	76 [b]	9.999346	+ 4 50 20.40 [b]	+ 47.70
204	St. Louis, Mo. . . .	+38 38 3.0	−11 18.1	. . .	[illegible]	+ 6 0 49.26	+ 59.27
205	St. Petersburg, Russia .	+59 56 32.0	−10 4.2	4	[illegible]	− 2 1 11.4	− 19.91
206	Stockholm, Sweden .	+59 20 32.7 [c]	−10 11.8	44 [c]	9.998922	− 1 12 13.97 [c]	− 11.87
207	Stonyhurst, England .	+53 50 40	−11 3.4	117 [c]	[illegible]	+ 0 9 52.68	+ 1.62
208	. .	+48 35 0.3 [c]	−11 30.5	144 [c]	[illegible]	− 0 31 4.52 [c]	− 5.11
209	. .	+39 54 23.3	−11 24.8	. . .	[illegible]	+ 5 1 24.80	+ 49.52
210	. .	−33 51 41.1	+10 42.9	44	[illegible]	−10 4 49.31	− 99.36
211	Syracuse, N. Y. . . .	+43 2 13.1	−11 33.9	160	[illegible]	+ 5 4 33.36	+ 50.03
212	.	+43 0 48.8 [h]	−11 33.8	137 [u]	9.999332	+ 5 4 34:31 [h]	+ 50.03
213	.	+19 24 17.9 [c]	− 7 14.8	2285 [c]	[illegible]	+ 6 36 46.67 [c]	+ 65.13
214	.	+41 19 31.3	−11 29.6	457	[illegible]	− 4 37 10.80	− 45.53
215	.	+41 54 0	−11 31.3	8	9.999351	+ 4 44 20	+ 46.71
216	.	+42 39 27 [d]	−11 33.1	396	9.999356	− 0 54 56	− 9.02
217	. . .	+35 39 17.0 [e]	−10 58.3	25	9.999507	− 9 18 58.22 [e]	− 91.82
218	Toronto . . .	+43 39 46.0 [f]	−11 34.8	110 [g]	9.999313	+ 5 17 34.70 [g]	+ 52.17
219	Toronto, Canada . . .	+43 40 0.8 [g]	−11 34.8	116 [g]	9.999313	+ 5 17 35.60 [g]	+ 52.17
220	. .	+43 36 44.0	−11 34.7	194	9.999320	− 0 5 51.23	− 0.96
221	Triest, Austria . . .	+45 38 35.5 [h]	−11 35.5	68 [i]	9.999260	− 0 55 5.23 [h]	− 9.05
222	Triest, Austria . . .	+45 38 45.4 [j]	−11 35.5	26 [i]	9.999257	− 0 55 3.0	− 9.04
223	Tschardjui, Turkestan .	+39 8 11.0 [d]	−11 20.7	188 [d]	9.999433	− 4 14 17.2 [d]	− 41.77
224	Tschardjui, Turkestan .	+39 8 10.7 [d]	−11 20.7	167	9.999431	− 4 13 57.3	− 41.72
225	Tulse Hill, England .	+51 26 47	−11 18.6	48	9 999111	+ 0 0 27.7	+ 0.08
226	Turin, Italy	+45 2 16.3 [k]	−11 35 7	616 [k]	9.999313	− 0 31 5.96 [k]	− 5.11
227	Turin, Italy	+45 4 8.3 [c]	−11 35.7	276 [i]	9 999288	− 0 30 47.15 [c]	− 5 06
228	Tuscaloosa, Ala. . . .	+33 12 36.8 [c]	−10 36.7	69	9.999568	+ 5 50 11.74 [c]	+ 57.53
229	Ukiah, Cal.	+39 8 12 1 [d]	−11 20.7	220 [d]	9.999435	+ 8 12 50 3 [d]	+ 80 96
230	Upsala, Sweden . . .	+59 51 29.4 [b]	−10 5.2	21 [b]	[illegible]	− 1 10 30.12 [b]	− 11 58
231	Urbana, Ill.	+40 6 20.2 [l]	−11 25.2	236 [l]	9.999412	+ 5 52 53.90 [l]	+ 57.97
232	Utrecht, Netherlands .	+52 5 9.7 [m]	−11 15.0	12 [m]	9.999093	− 0 20 31.0 [m]	− 3 37
233	Utrecht, Netherlands .	+52 5 13	−11 15.0	23	9.999093	− 0 20 28 9	− 3.36
234	Venice, Italy	+45 26 10.5 [c]	−11 35.6	15 [c]	9.999261	− 0 49 22.12 [c]	− 8.11
235	Vienna, Austria . . .	+48 13 55.1 [n]	−11 31 5	240 [i]	9 999205	− 1 5 21 35 [n]	− 10.74
236	Vienna, Austria . . .	+48 12 35.5	−11 31.6	186 [i]	9.999202	− 1 5 31.61	− 10.76
237	Vienna, Austria . . .	+48 12 53.8	−11 31 6	214	9.999204	− 1 5 25 17	− 10.75
238	Vienna, Austria . . .	+48 12 46.7 [c]	−11 31.6	285	9.999209	− 1 5 10.96	− 10.71
239	Warsaw, Russia . . .	+52 13 4.6 [c]	−11 14.3	121 [c]	9.999097	− 1 24 7.25 [c]	− 13 82
240	Washington, D. C. . .	+38 55 14.0 [o]	−11 19.6	82 [p]	9.999431	+ 5 8 15.78 [o]	+ 50 64
241	Washington, D. C. . .	+38 53 38 7 [q]	−11 19.4	31 [r]	9.999428	+ 5 8 12.15 [q]	+ 50.63
242	Washington, D. C. . .	+38 53 17.3 [s]	−11 19.4	10 [s]	9.999427	+ 5 8 6.24 [s]	+ 50 61
243	Washington, D. C. . .	+38 56 14.8 [a]	−11 19.7	. . .	9.999425	+ 5 8 0 0 [a]	+ 50.60
244	Wellesley, Mass. . . .	+42 17 34.8	−11 32.3	61	9.999344	+ 4 45 12.7	+ 46.85
245	Wellington, N. Z. . .	−41 17 3.8 [b]	+11 29.5	127 [b]	[illegible]	−11 39 4.27 [b]	−114.84
246	West Point, N. Y. . .	+41 23 22.1	−11 29.9	170	9.999375	+ 4 55 50.55	+ 48.60
247	Wilhelmshaven, Germany	+53 31 52 1 [c]	−11 5.7	9 [c]	9.999057	− 0 32 35 06 [c]	− 5.35
248	Williams Bay, Wis. . .	+42 34 12.6 [t]	−11 33.0	320 [t]	9.999355	+ 5 54 13.24 [t]	+ 58.19
249	Williamstown, Mass. .	+42 42 30	−11 33.2	213	9.999344	+ 4 52 50	+ 48.10
250	Winchester, Mass. . .	+42 27 11	−11 32 7	30	9.999338	+ 4 44 32 4	+ 46.74
251	Windsor, N. S. W. . .	−33 36 30.8 [b]	+10 40.6	16 [r]	9.999556	−10 3 19.9	− 99.11
252	. .	+31 5 48.0 [c]	−10 14.4	100 [c]	9 999619	− 8 4 44.82 [c]	− 79.63
253	.	+47 22 38.3 [c]	−11 33.5	469 [c]	9.999243	− 0 34 12.26 [c]	− 5.62

a
b
c
d
e
f Main dome.
g Transit pier.

h
i
j
k
l
m
n

o Center of the clock room.
p Ground floor of main building.
q Small dome.
r Barometer.
s Siderostat pier.
t 40-inch equatorial.
u Intersection of equatorial axes.

No.	Authority for— Latitude.	Longitude.	Description.
202	Letter from Director, 1913.	*Washington Observations*, 1875.	Sayre Obs., Lehigh Univ.
203	*Amer. Jour. of Sci.*, 1883.	Letter from Director, 1913.	Williston Obs., Mt. Holyoke Coll.
204	Letter from Director, 1897.	*U. S. C. and G. S. Report*, 1897.	[a] Washington University Obs.
205	*Astron. Nach.*, Nr. 2582, 1884.	*Astron. Nach.*, Nr. 2582, 1884.	Imperial University Obs.
206	Letter from Director, 1914.	*Astron. Nach.*, Nr. 3993, 1905.	Obs. of Acad. of Sci.
207	Letter from Director, 1913.	*Monthly Notices, R. A. S.*, 1851.	Stonyhurst College Obs.
208	*Annalen* der Sternw., 1896.	*Astron. Nach.*, Nr. 3993, 1905.	Imperial Univ. Obs.
209	Letter from Director, 1912.	Letter from Director, 1912.	Sproul Obs., Swarthmore College.
210	*Astron. Results*, 1879–81.	See footnote ([b]).	Government Observatory.
211	Letter from Director, 1891.	Letter from Director, 1891.	Syracuse Univ. Obs.
212	Letter from Director, 1914.	Letter from Director, 1914.	Roe Observatory.
213	*Boletin del Obs.*, 1914.	*Annuario del Obs.*, 1902.	National Observatory.
214	Letter from Director, 1897.	Letter from Director, 1897.	Tashkent Observatory.
215	*Les Obs. Astron.*, Bruxelles, 1907.	*Les Obs. Astron.*, Bruxelles, 1907.	Mr. Metcalf's Obs., before 1911.
216	*Pubbl. dell'Osserv.*, 1900.	Letter from Director, 1913.	Collurania Observatory.
217	*Annales de l'Obs.*, 1894.	*Annales de l'Obs.*, 1894.	University Observatory.
218	Letter from Director, 1913.	Letter from Director, 1913.	University Observatory.
219	Letter from Director, 1912.	Letter from Director, 1912.	Meteorological Observatory.
220	*Annales de l'Obs.*, 1912.	British *Nautical Almanac*.	University Observatory.
221	Letter from Director, 1913.	Letter from Director, 1913.	[c] Imperial and Royal Maritime Obs.
222	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	[d] Imperial and Royal Maritime Obs.
223	*Astron. Nach.*, Nr. 4588, 1912.	Letter from Director, 1913.	International Lat. Obs., since 1909.
224	See footnote ([e]).	See footnote ([l]).	International Lat. Obs., before 1909.
225	British *Nautical Almanac*.	British *Nautical Almanac*.	Obs. of Sir W. Huggins, London.
226	Letter from Director, 1915.	Letter from Director, 1915.	[f] Royal Obs. of the Univ., since 1913.
227	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	[g] Royal Obs. of the Univ., before 1913.
228	Letter from Director, 1897.	Letter from Director, 1897.	Obs. Univ. of Ala.
229	See footnote ([e]).	Letter from Director, 1912.	International Lat. Obs.
230	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	University Observatory.
231	Letter from Director, 1913.	Letter from Director, 1913.	Obs., Univ. of Ill.
232	Letter from Director, 1913.	Letter from Director, 1913.	University Obs., since 1855.
233	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	University Obs., before 1855.
234	Letter from Director, 1913.	Letter from Director, 1913.	Obs. of the Nautical Institute.
235	See footnote ([h]).	*Astron. Nach.*, Nr. 3993, 1905.	[i] Imperial and Royal Univ. Obs.
236	Letter, Director new Obs., 1913.	Letter, Director new Obs., 1913.	[j] Imperial and Royal Univ. Obs.
237	*Berliner Jahrbuch*.	*Berliner Jahrbuch*.	Oppolzer Obs., Josephstadt.
238	*Publik. der Sternw.*, 1892.	*Astron. Nach.*, Nr. 3993, 1905.	Kuffner Obs., Ottakring.
239	*Astron. Nach.*, Nr. 4666, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Imperial University Obs.
240	*U. S. Naval Obs. Publications*, 1900.	*U. S. C. and G. S. Report*, 1897.	U. S. N. Obs., Georgetown Heights.
241	See footnote ([m]).	*U. S. C. and G. S. Report*, 1897.	U. S. Naval Obs., 1842–1893.
242	Letter from Director, 1912.	Letter from Director, 1912.	Smithsonian Astrophysical Obs.
243	*Astronomical Journal*, 1897.	*Astronomical Journal*, 1897.	Catholic Univ. Obs., Brookland.
244	Letter from Director, 1912.	*Les Obs. Astron.*, Bruxelles, 1907.	Whitin Obs., Wellesley College.
245	*New Zealand Gazette*, May 7, 1914.	*New Zealand Gazette*, May 7, 1914.	Hector Observatory.
246	Letter from Director, 1891.	Letter from Director, 1891.	[k] U. S. Military Academy.
247	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3993, 1905.	Imperial Naval Obs.
248	*Astrophysical Journal*, 1901.	*Astrophysical Journal*, 1901.	Yerkes Obs., Univ. of Chicago.
249	Letter from Director, 1893.	Letter from Director, 1893.	Field Memorial Obs., Williams Coll.
250	Letter from Director, 1913.	Letter from Director, 1913.	Mr. Metcalf's Obs., since 1911.
251	*Monthly Notices, R. A. S.*, 1884.	[n] *Monthly Notices, R. A. S.*, 1888.	Mr. John Tebbutt's Obs.
252	*Annales de l'Obs.*, 1907.	*Annales de l'Obs.*, 1907.	Obs. of the Jesuits near Shanghai.
253	Letter from Director, 1913.	*Astron. Nach.*, Nr. 3202, 1893.	Obs. of Swiss Polytechnic School.

[a] Old observatory $0^m.125$ E.
[b] Letter from Government Astronomer at Adelaide, 1913.
[c] Since 1898.
[d] Before 1898.
[e] *Resultate des Internationalen Breitendienstes*, 1900–1908.
[f] At Pino Torinese.
[g] At Palazzo Madama.
[h] *Astron. Arbeiten des K. K. Gradmessungs-Bureau*, 1896.
[i] Since 1879.
[j] Before 1879.
[k] Old observatory 9″ N., $1^s.2$ E.
[l] *Resultate des Internationalen Breitendienstes*, Band I, 1903.
[m] *Washington Observations* for 1892, Appendix I, pp. XX[illegible] and XXXII.
[n] And the new value of the longitude of Sydney.

THE COMPUTATION OF LUNAR DISTANCES.

Tables of lunar distances are no longer given in the Ephemeris, in accordance with the decision of the Navy Department that they are now of little practical use to navigators. However, in case it is desired to use this method, the angular distance between the Moon and any heavenly body may be calculated by solving the spherical triangle of which the known parts are the polar distances of the Moon and the other body and the difference of their right ascensions, or, in other words, the angle at the pole between their hour-circles. Then, the Greenwich mean time of the observation being approximately known, and the lunar distances for the star or other body calculated for the even hour before and after, the required lunar distance may be interpolated and the longitude derived by the methods given in books on navigation.

EXAMPLE 1.

Find the lunar distance of Aldebaran, July 27, 1919, at 10 P. M., Greenwich Mean Time.

Let α and δ = Right Ascension and Declination of the star
" α' and δ' = " " " " " " Moon
" D = Lunar Distance

Also let $\tan M = \tan \delta' \sec (\alpha - \alpha')$

Then $\cos D = \sin \delta' \cos (M - \delta) \operatorname{cosec} M$

α	$4^h\ 31^m\ 18^s.5$	M	$28°\ 23'\ 10''$
α'	$8^h\ 55^m\ 22^s.2$	δ	$+16°\ 20'\ 53''$
$\alpha - \alpha'$	$19^h\ 35^m\ 56^s.3$	$M - \delta$	$12°\ 2'\ 17''$
$\alpha - \alpha'$	$293°\ 59'\ 4''$	$\sin \delta'$	9.331520
δ'	$+12°\ 23'\ 20''$	$\cos (M - \delta)$	9.990343
		cosec M	0.322931
$\tan \delta'$	9.341753		
$\sec (\alpha - \alpha')$	0.390952	cos D	9.644794
tan M	9.732705	D	$63°\ 48'\ 33''$

EXAMPLE 2.

Find the lunar distance of Jupiter, March 11, 1919, at noon, Greenwich Mean Time. In this case the distance is smaller and the following method is more accurate:

Let α and δ = Right Ascension and Declination of the planet
" α' and δ' = " " " " " " Moon
" D = Lunar Distance

Also let $\tan N = \tan \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} \frac{1}{2} (\delta - \delta')$

Then $\sin \frac{1}{2} D = \sin \frac{1}{2} (\alpha - \alpha') \cos \frac{1}{2} (\delta + \delta') \operatorname{cosec} N$

Sin N and $\sin \frac{1}{2} (\alpha - \alpha')$ have the same algebraic sign.

α	$6^h\ 25^m\ 40^s.9$	$\tan \frac{1}{2} (\alpha - \alpha')$	9.092439 *n*
α'	$7^h\ 22^m\ 6^s.3$	$\cos \frac{1}{2} (\delta + \delta')$	9.969878
$\alpha - \alpha'$	$23^h\ 3^m\ 34^s.6$	$\operatorname{cosec} \frac{1}{2} (\delta - \delta')$	1.379447
$\alpha - \alpha'$	$345°\ 53'\ 39''$	tan N	0.441764 *n*
δ	$+23°\ 29'\ 9''$	N	$109°\ 52'\ 49''$
δ'	$+18°\ 42'\ 5''$		
$\delta + \delta'$	$+42°\ 11'\ 14''$	$\sin \frac{1}{2} (\alpha - \alpha')$	9.089140
$\delta - \delta'$	$+4°\ 47'\ 4''$	$\cos \frac{1}{2} (\delta + \delta')$	9.969878
		cosec N	0.026685
$\frac{1}{2} (\alpha - \alpha')$	$172°\ 56'\ 50''$	$\sin \frac{1}{2}$ D	9.085703
$\frac{1}{2} (\delta + \delta')$	$+21°\ 5'\ 37''$	$\frac{1}{2}$ D	$6°\ 59'\ 49''$
$\frac{1}{2} (\delta - \delta')$	$+2°\ 23'\ 32''$	D	$13°\ 59'\ 38''$

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1919.

Reduce the observed altitude of Polaris to the true altitude.

Reduce the recorded time of observation to the local sidereal time.

Take out the apparent right ascension and declination of Polaris for the time of observation.

Subtract the apparent right ascension from the local sidereal time of observation and the remainder is the hour-angle of Polaris.

With this hour-angle as the vertical argument, and the apparent declination of Polaris as the horizontal argument, take out the correction from Table I and add it to or subtract it from the true altitude, according to its sign.

For altitudes other than 45°, corrections taken from the supplementary table at the bottom of Table I (Table Ia) may be applied when necessary for the degree of accuracy required.

Example.—August 5, 1919, at $10^h\ 40^m\ 30^s$ P. M. local mean solar time, in longitude 59° west of Greenwich, suppose the true altitude of Polaris to be 33° 20′ 0″, required the latitude of the place.

	h	m	s
Local astronomical mean time	10	40	30
Reduction from Table III for $10^h\ 40^m\ 30^s$		+ 1	45
Greenwich sidereal time of mean noon, August 5, page 10 .	8	51	57
Reduction from Table III, for longitude ($-3^h\ 56^m$ west, or plus)		+ 0	39
Sum (having regard to signs) is equal to local sidereal time .	19	34	51
R. A. of Polaris (page 281) for time of observation . . .	1	32	13
Remainder is equal to hour-angle of Polaris	18	2	38
Decl. of Polaris (page 281) for time of observation, 88° 52′ 17″ .			
	°	′	″
True altitude	+33	20	0
Correction from Table I		− 0	7
Correction from Table Ia			−13
Latitude of the place	+33	19	40

Observations of Polaris for latitude should be made when practicable near the times of upper or of lower culminations (hour-angle 0^h or 12^h). However, at sea, if made near elongation (hour-angle 6^h or 18^h), the hour-angle, and hence the local time, should be known within one minute.

H. A. \ Decl.	88° 52′ 10″		88° 52′ 20″		88° 52′ 30″		88° 52′ 40″		88° 52′ 50″		88° 53′ 0″		Decl. / H. A.
h m	′ ″		′ ″		′ ″		′ ″		′ ″		′ ″		h m
0 0	−67 50	0	−67 40	0	−67 30	0	−67 20	0	−67 10	0	−67 0	0	24 0
3	67 50	1	67 40	1	67 30	1	67 20	1	67 10	1	67 0	1	23 57
6	67 49	2	67 39	2	67 29	2	67 19	2	67 9	2	66 59	2	54
9	67 47	3	67 37	3	67 27	3	67 17	3	67 7	3	66 57	3	51
12	67 44	3	67 34	3	67 24	3	67 14	3	67 4	3	66 54	3	48
0 15	−67 41	4	−67 31	4	−67 21	4	−67 11	4	−67 1	4	−66 51	4	23 45
18	67 37	4	67 27	4	67 17	4	67 7	4	66 57	4	66 47	4	42
21	67 33	6	67 23	6	67 13	6	67 3	6	66 53	5	66 43	5	39
24	67 27	6	67 17	6	67 7	6	66 57	6	66 48	6	66 38	6	36
27	67 21	7	67 11	7	67 1	6	66 51	6	66 42	7	66 32	7	33
0 30	−67 14	7	−67 4	7	−66 55	8	−66 45	8	−66 35	8	−66 25	7	23 30
33	67 7	8	66 57	8	66 47	8	66 37	8	66 27	8	66 18	8	27
36	66 59	9	66 49	9	66 39	9	66 29	8	66 19	8	66 10	9	24
39	66 50	9	66 40	9	66 30	9	66 21	10	66 11	10	66 1	10	21
42	66 41	11	66 31	11	66 21	10	66 11	10	66 1	10	65 51	10	18
0 45	−66 30	11	−66 20	11	−66 11	11	−66 1	11	−65 51	11	−65 41	11	23 15
48	66 19	11	66 9	11	66 0	12	65 50	12	65 40	11	65 30	11	12
51	66 8	13	65 58	12	65 48	12	65 38	12	65 29	12	65 19	12	9
54	65 55	13	65 46	13	65 36	13	65 26	13	65 17	13	65 7	13	6
0 57	65 42	13	65 33	14	65 23	14	65 13	13	65 4	14	64 54	14	3
1 0	−65 29	15	−65 19	14	−65 9	14	−65 0	15	−64 50	14	−64 40	14	23 0
3	65 14	15	65 5	15	64 55	15	64 45	15	64 36	15	64 26	15	22 57
6	64 59	16	64 50	16	64 40	16	64 30	15	64 21	16	64 11	15	54
9	64 43	16	64 34	16	64 24	16	64 15	16	64 5	16	63 56	16	51
1 12	−64 27		−64 18		−64 8		−63 59		−63 49		−63 40		22 4

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1919.

Decl. / H. A.	88° 52′ 10″		88° 52′ 20″		88° 52′ 30″		88° 52′ 40″		88° 52′ 50″		88° 53′ 0″		Decl. / H. A.
h m	′ ″		′ ″		′ ″		′ ″		′ ″		′ ″		h m
1 12	−64 27	17	−64 18	18	−64 8	17	−63 59	17	−63 49	17	−63 40	17	22 48
15	64 10	18	64 0	17	63 51	18	63 42	18	63 32	18	63 23	18	45
18	63 52	18	63 43	19	63 33	18	63 24	18	63 14	18	63 5	18	42
21	63 34	19	63 24	19	63 15	19	63 6	19	62 56	19	62 47	19	39
24	63 15	20	63 5	19	62 56	20	62 47	20	62 37	19	62 28	20	36
1 27	−62 55	21	−62 46	21	−62 36	20	−62 27	20	−62 18	20	−62 8	20	22 33
30	62 34	21	62 25	21	62 16	21	62 7	21	61 58	21	61 48	21	30
33	62 13	21	62 4	22	61 55	22	61 46	22	61 37	22	61 27	21	27
36	61 52	23	61 42	22	61 33	22	61 24	22	61 15	22	61 6	22	24
39	61 29	23	61 20	23	61 11	23	61 2	23	60 53	23	60 44	23	21
1 42	−61 6	24	−60 57	23	−60 48	23	−60 39	23	−60 30	23	−60 21	23	22 18
45	60 42	24	60 34	25	60 25	24	60 16	24	60 7	24	59 58	24	15
48	60 18	25	60 9	25	60 1	25	59 52	25	59 43	25	59 34	25	12
51	59 53	25	59 44	25	59 36	26	59 27	25	59 18	25	59 9	25	9
54	59 28	26	59 19	26	59 10	26	59 2	26	58 53	26	58 44	26	6
1 57	−59 2	27	−58 53	27	−58 44	26	−58 36	27	−58 27	27	−58 18	26	22 3
2 0	58 35	28	58 26	27	58 18	28	58 9	27	58 0	27	57 52	27	22 0
3	58 7	28	57 59	28	57 50	28	57 42	28	57 33	27	57 25	28	21 57
6	57 39	28	57 31	29	57 22	28	57 14	28	57 6	29	56 57	28	54
9	57 11	29	57 2	29	56 54	29	56 46	29	56 37	29	56 29	29	51
2 12	−56 42	30	−56 33	29	−56 25	30	−56 17	30	−56 8	29	−56 0	29	21 48
15	56 12	31	56 4	31	55 55	30	55 47	30	55 39	30	55 31	30	45
18	55 41	31	55 33	31	55 25	31	55 17	31	55 9	31	55 1	31	42
21	55 10	31	55 2	31	54 54	31	54 46	31	54 38	31	54 30	31	39
24	54 39	32	54 31	32	54 23	32	54 15	32	54 7	32	53 59	32	36
2 27	−54 7	33	−53 59	33	−53 51	33	−53 43	32	−53 35	32	−53 27	32	21 33
30	53 34	33	53 26	33	53 18	33	53 11	33	53 3	33	52 55	33	30
33	53 1	34	52 53	34	52 45	33	52 38	34	52 30	34	52 22	33	27
36	52 27	34	52 19	34	52 12	34	52 4	34	51 56	34	51 49	34	24
39	51 53	35	51 45	34	51 38	35	51 30	35	51 22	34	51 15	34	21
2 42	−51 18	35	−51 11	36	−51 3	35	−50 55	35	−50 48	35	−50 41	35	21 18
45	50 43	36	50 35	36	50 28	36	50 20	35	50 13	36	50 6	36	15
48	50 7	37	49 59	36	49 52	36	49 45	36	49 37	36	49 30	36	12
51	49 30	37	49 23	37	49 16	37	49 9	37	49 1	36	48 54	36	9
54	48 53	37	48 46	37	48 39	37	48 32	37	48 25	37	48 18	37	6
2 57	−48 16	38	−48 9	38	−48 2	38	−47 55	38	−47 48	38	−47 41	38	21 3
3 0	47 38	38	47 31	38	47 24	38	47 17	38	47 10	38	47 3	38	21 0
3	47 0	39	46 53	39	46 46	39	46 39	39	46 32	38	46 25	38	20 57
6	46 21	40	46 14	39	46 7	39	46 0	39	45 54	39	45 47	39	54
9	45 41	40	45 35	40	45 28	40	45 21	39	45 15	40	45 8	40	51
3 12	−45 1	40	−44 55	40	−44 48	40	−44 42	40	−44 35	40	−44 28	39	20 48
15	44 21	41	44 15	41	44 8	41	44 2	41	43 55	40	43 49	41	45
18	43 40	41	43 34	41	43 27	41	43 21	41	43 15	41	43 8	40	42
21	42 59	42	42 53	42	42 46	41	42 40	41	42 34	41	42 28	42	39
24	42 17	42	42 11	42	42 5	42	41 59	42	41 53	42	41 46	41	36
3 27	−41 35	42	−41 29	42	−41 23	42	−41 17	42	−41 11	42	−41 5	42	20 33
30	40 53	43	40 47	43	40 41	43	40 35	43	40 29	43	40 23	43	30
33	40 10	44	40 4	43	39 58	43	39 52	43	39 46	43	39 40	43	27
36	39 26	44	39 21	44	39 15	44	39 9	43	39 3	43	38 57	43	24
39	38 42	44	38 37	44	38 31	44	38 26	44	38 20	44	38 14	43	21
3 42	−37 58	44	−37 53	45	−37 47	44	−37 42	45	−37 36	44	−37 31	44	20 18
45	37 14	45	37 8	45	37 3	45	36 57	44	36 52	45	36 47	45	15
48	36 29	46	36 23	45	36 18	45	36 13	45	36 7	45	36 2	45	12
51	35 43	45	35 38	45	35 33	46	35 28	46	35 22	45	35 17	45	9
54	34 58	46	34 53	46	34 47	45	34 42	45	34 37	45	34 32	45	6
3 57	−34 12	47	−34 7	47	−34 2	47	−33 57	46	−33 52	46	−33 47	46	20 3
4 0	33 25	47	33 20	46	33 15	46	33 11	47	33 6	47	33 1	46	20 0
3	32 38	47	32 34	47	32 29	47	32 24	47	32 19	46	32 15	47	19 57
6	31 51	47	31 47	48	31 42	47	31 37	47	31 33	47	31 28	47	54
4 9	−31 4		−30 59		−30 55		−30 50		−30 46		−30 41		19 51

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1919.

H. A. \ Decl.	88° 52′ 10″		88° 52′ 20″		88° 52′ 30″		88° 52′ 40″		88° 52′ 50″		88° 53′ 0″		Decl. \ H. A.
h m	′ ″		′ ″		′ ″		′ ″		′ ″		′ ″		h m
4 9	−31 4	48	−30 59	47	−30 55	48	−30 50	47	−30 46	47	−30 41	47	19 51
12	30 16	48	30 12	48	30 7	48	30 3	48	29 59	48	29 54	47	48
15	29 28	48	29 24	48	29 19	48	29 15	48	29 11	48	29 7	48	45
18	28 40	49	28 36	49	28 31	48	28 27	48	28 23	48	28 19	48	42
21	27 51	49	27 47	49	27 43	49	27 39	49	27 35	49	27 31	48	39
4 24	−27 2	49	−26 58	49	−26 54	49	−26 50	49	−26 46	48	−26 43	49	19 36
27	26 13	49	26 9	49	26 5	49	26 1	49	25 58	49	25 54	49	33
30	25 24	50	25 20	50	25 16	49	25 12	49	25 9	49	25 5	49	30
33	24 34	50	24 30	50	24 27	50	24 23	49	24 20	50	24 16	49	27
36	23 44	50	23 40	50	23 37	50	23 34	50	23 30	50	23 27	50	24
4 39	−22 54	51	−22 50	50	−22 47	50	−22 44	50	−22 40	50	−22 37	50	19 21
42	22 3	50	22 0	51	21 57	51	21 54	51	21 50	50	21 47	50	18
45	21 13	51	21 9	50	21 6	50	21 3	50	21 0	50	20 57	50	15
48	20 22	51	20 19	51	20 16	51	20 13	51	20 10	51	20 7	50	12
51	19 31	52	19 28	51	19 25	51	19 22	51	19 19	50	19 17	51	9
4 54	−18 39	51	−18 37	52	−18 34	51	−18 31	51	−18 29	51	−18 26	51	19 6
4 57	17 48	52	17 45	51	17 43	52	17 40	51	17 38	52	17 35	51	3
5 0	16 56	52	16 54	52	16 51	51	16 49	52	16 46	51	16 44	51	19 0
3	16 4	52	16 2	52	16 0	52	15 57	51	15 55	51	15 53	51	18 57
6	15 12	52	15 10	52	15 8	52	15 6	52	15 4	52	15 2	52	54
5 9	−14 20	52	−14 18	52	−14 16	52	−14 14	52	−14 12	52	−14 10	52	18 51
12	13 28	52	13 26	52	13 24	52	13 22	52	13 20	52	13 18	51	48
15	12 36	53	12 34	53	12 32	52	12 30	52	12 28	52	12 27	52	45
18	11 43	53	11 41	52	11 40	53	11 38	52	11 36	52	11 35	52	42
21	10 50	52	10 49	53	10 47	52	10 46	52	10 44	52	10 43	52	39
5 24	− 9 58	53	− 9 56	52	− 9 55	53	− 9 54	53	− 9 52	52	− 9 51	53	18 36
27	9 5	53	9 4	53	9 2	52	9 1	53	9 0	53	8 58	52	33
30	8 12	53	8 11	53	8 10	53	8 8	52	8 7	52	8 6	52	30
33	7 19	53	7 18	53	7 17	53	7 16	53	7 15	53	7 14	53	27
36	6 26	53	6 25	53	6 24	53	6 23	53	6 22	52	6 21	52	24
5 39	− 5 33	53	− 5 32	53	− 5 31	53	− 5 30	52	− 5 30	53	− 5 29	53	18 21
42	4 40	54	4 39	53	4 38	53	4 38	53	4 37	53	4 36	52	18
45	3 46	53	3 46	53	3 45	53	3 45	53	3 44	52	3 44	53	15
48	2 53	53	2 53	53	2 52	53	2 52	53	2 52	53	2 51	52	12
51	2 0	54	2 0	54	1 59	53	1 59	53	1 59	53	1 59	53	9
5 54	− 1 6	53	− 1 6	53	− 1 6	53	− 1 6	53	− 1 6	53	− 1 6	53	18 6
5 57	− 0 13	53	− 0 13	53	− 0 13	53	− 0 13	53	− 0 13	52	− 0 13	52	3
6 0	+ 0 40	53	+ 0 40	53	+ 0 40	53	+ 0 40	52	+ 0 39	53	+ 0 39	53	18 0
3	1 33	54	1 33	53	1 33	53	1 32	53	1 32	53	1 32	52	17 57
6	2 27	53	2 26	53	2 26	53	2 25	53	2 25	53	2 24	53	54
6 9	+ 3 20	53	+ 3 19	53	+ 3 19	53	+ 3 18	53	+ 3 18	52	+ 3 17	52	17 51
12	4 13	53	4 12	53	4 12	52	4 11	53	4 10	53	4 9	53	48
15	5 6	53	5 5	53	5 4	53	5 4	52	5 3	52	5 2	52	45
18	5 59	53	5 58	53	5 57	53	5 56	53	5 55	53	5 54	53	42
21	6 52	53	6 51	53	6 50	53	6 49	52	6 48	52	6 47	52	39
6 24	+ 7 45	53	+ 7 44	53	+ 7 43	52	+ 7 41	53	+ 7 40	53	+ 7 39	52	17 36
27	8 38	53	8 37	52	8 35	53	8 34	52	8 33	52	8 31	52	33
30	9 31	52	9 29	53	9 28	52	9 26	53	9 25	52	9 23	52	30
33	10 23	53	10 22	52	10 20	52	10 19	52	10 17	52	10 15	52	27
36	11 16	52	11 14	52	11 12	53	11 11	52	11 9	52	11 7	52	24
6 39	+12 8	53	+12 6	53	+12 5	52	+12 3	52	+12 1	52	+11 59	52	17 21
42	13 1	52	12 59	52	12 57	51	12 55	51	12 53	51	12 51	51	18
45	13 53	52	13 51	51	13 48	52	13 46	52	13 44	52	13 42	51	15
48	14 45	52	14 42	52	14 40	52	14 38	51	14 36	51	14 33	52	12
51	15 37	51	15 34	52	15 32	51	15 29	52	15 27	51	15 25	51	9
6 54	+16 28	52	+16 26	51	+16 23	51	+16 21	51	+16 18	51	+16 16	50	17 6
6 57	17 20	51	17 17	51	17 14	51	17 12	51	17 9	51	17 6	51	3
7 0	18 11	51	18 8	51	18 5	51	18 3	50	18 0	50	17 57	51	17 0
3	19 2	51	18 59	51	18 56	51	18 53	51	18 50	51	18 48	50	16 57
7 6	+19 53		+19 50		+19 47		+19 44		+19 41		+19 38		16 54

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1919.

H. A. \ Decl.	88° 52′ 10″		88° 52′ 20″		88° 52′ 30″		88° 52′ 40″		88° 52′ 50″		88° 53′ 0″		Decl. / H. A.
h m	′ ″		′ ″		′ ″		′ ″		′ ″		′ ″		h m
7 6	+19 53	51	+19 50	51	+19 47	50	+19 44	50	+19 41	50	+19 38	50	16 54
9	20 44	50	20 41	50	20 37	51	20 34	50	20 31	50	20 28	50	51
12	21 34	50	21 31	50	21 28	50	21 24	50	21 21	50	21 18	50	48
15	22 24	50	22 21	50	22 18	49	22 14	50	22 11	49	22 8	49	45
18	23 14	50	23 11	50	23 7	50	23 4	49	23 0	50	22 57	49	42
7 21	+24 4	50	+24 1	49	+23 57	49	+23 53	49	+23 50	49	+23 46	49	16 39
24	24 54	49	24 50	49	24 46	49	24 42	49	24 39	49	24 35	49	36
27	25 43	49	25 39	49	25 35	49	25 31	49	25 28	48	25 24	48	33
30	26 32	49	26 28	49	26 24	48	26 20	48	26 16	48	26 12	48	30
33	27 21	48	27 17	48	27 12	49	27 8	48	27 4	48	27 0	48	27
7 36	+28 9	48	+28 5	48	+28 1	48	+27 56	48	+27 52	48	+27 48	48	16 24
39	28 57	48	28 53	48	28 49	47	28 44	48	28 40	47	28 36	47	21
42	29 45	48	29 41	47	29 36	47	29 32	47	29 27	47	29 23	47	18
45	30 33	47	30 28	47	30 23	47	30 19	47	30 14	47	30 10	46	15
48	31 20	47	31 15	47	31 10	47	31 6	46	31 1	46	30 56	47	12
7 51	+32 7	46	+32 2	46	+31 57	46	+31 52	46	+31 47	46	+31 43	46	16 9
54	32 53	46	32 48	46	32 43	46	32 38	46	32 33	46	32 29	45	6
7 57	33 39	46	33 34	46	33 29	46	33 24	46	33 19	46	33 14	46	3
8 0	34 25	46	34 20	46	34 15	45	34 10	45	34 5	45	34 0	45	16 0
3	35 11	45	35 6	45	35 0	45	34 55	45	34 50	44	34 45	44	15 57
8 6	+35 56	45	+35 51	44	+35 45	45	+35 40	44	+35 34	45	+35 29	44	15 54
9	36 41	44	36 35	44	36 30	44	36 24	44	36 19	44	36 13	44	51
12	37 25	44	37 19	44	37 14	44	37 8	44	37 3	43	36 57	44	48
15	38 9	44	38 3	44	37 58	43	37 52	43	37 46	43	37 41	43	45
18	38 53	43	38 47	43	38 41	43	38 35	43	38 29	43	38 24	43	42
8 21	+39 36	43	+39 30	43	+39 24	43	+39 18	43	+39 12	43	+39 7	42	15 39
24	40 19	42	40 13	42	40 7	42	40 1	42	39 55	42	39 49	42	36
27	41 1	42	40 55	42	40 49	42	40 43	42	40 37	41	40 31	41	33
30	41 43	42	41 37	41	41 31	41	41 25	41	41 18	41	41 12	41	30
33	42 25	41	42 18	41	42 12	41	42 6	41	41 59	41	41 53	41	27
8 36	+43 6	41	+42 59	41	+42 53	40	+42 47	40	+42 40	40	+42 34	40	15 24
39	43 47	40	43 40	40	43 33	40	43 27	40	43 20	40	43 14	40	21
42	44 27	40	44 20	40	44 13	40	44 7	39	44 0	40	43 54	39	18
45	45 7	39	45 0	39	44 53	39	44 46	39	44 40	39	44 33	39	15
48	45 46	39	45 39	39	45 32	39	45 25	39	45 19	38	45 12	38	12
8 51	+46 25	38	+46 18	38	+46 11	38	+46 4	38	+45 57	38	+45 50	38	15 9
54	47 3	38	46 56	38	46 49	38	46 42	38	46 35	38	46 28	37	6
8 57	47 41	37	47 34	37	47 27	37	47 20	37	47 13	37	47 5	37	3
9 0	48 18	37	48 11	37	48 4	37	47 57	36	47 50	36	47 42	37	15 0
3	48 55	36	48 48	36	48 41	36	48 33	36	48 26	36	48 19	36	14 57
9 6	+49 31	36	+49 24	36	+49 17	36	+49 9	36	+49 2	36	+48 55	35	14 54
9	50 7	36	50 0	35	49 53	35	49 45	35	49 38	35	49 30	35	51
12	50 43	35	50 35	35	50 28	34	50 20	35	50 13	34	50 5	35	48
15	51 18	34	51 10	34	51 2	35	50 55	34	50 47	34	50 40	34	45
18	51 52	34	51 44	34	51 37	33	51 29	33	51 21	34	51 14	33	42
9 21	+52 26	33	+52 18	33	+52 10	33	+52 2	33	+51 55	33	+51 47	33	14 39
24	52 59	33	52 51	33	52 43	33	52 35	33	52 28	32	52 20	32	36
27	53 32	32	53 24	32	53 16	32	53 8	32	53 0	32	52 52	32	33
30	54 4	32	53 56	32	53 48	31	53 40	31	53 32	31	53 24	31	30
33	54 36	31	54 28	31	54 19	31	54 11	31	54 3	31	53 55	31	27
9 36	+55 7	30	+54 59	30	+54 50	31	+54 42	30	+54 34	30	+54 26	30	14 24
39	55 37	30	55 29	30	55 21	30	55 12	30	55 4	30	54 56	30	21
42	56 7	30	55 59	29	55 51	29	55 42	29	55 34	29	55 26	29	18
45	56 37	29	56 28	29	56 20	29	56 11	29	56 3	29	55 55	28	15
48	57 6	28	56 57	28	56 49	28	56 40	28	56 32	28	56 23	28	12
9 51	+57 34	27	+57 25	28	+57 17	27	+57 8	28	+57 0	27	+56 51	27	14 9
54	58 1	27	57 53	27	57 44	27	57 36	27	57 27	27	57 18	27	6
9 57	58 28	27	58 20	26	58 11	26	58 3	26	57 54	26	57 45	26	3
10 0	*58 55*	26	58 46	26	58 37	26	58 29	25	58 20	26	58 11	26	14 0
10 3	*+59 21*		+59 12		+59 3		+58 54		+58 46		+58 37		13 57

FOR FINDING THE LATITUDE BY AN OBSERVED ALTITUDE OF POLARIS, 1919.

H.A. \ Decl.	88° 52′ 10″		88° 52′ 20″		88° 52′ 30″		88° 52′ 40″		88° 52′ 50″		88° 53° 0″		Decl. / H.A.
h m	′ ″		′ ″		′ ″		′ ″		′ ″		′ ″		h m
10 3	+59 21	25	+59 12	25	+59 3	25	+58 54	25	+58 46	25	+58 37	25	13 57
6	59 46	25	59 37	25	59 28	25	59 19	25	59 11	24	59 2	24	54
9	60 11	24	60 2	24	59 53	24	59 44	24	59 35	24	59 26	24	51
12	60 35	23	60 26	23	60 17	23	60 8	23	59 59	23	59 50	23	48
15	60 58	23	60 49	23	60 40	23	60 31	23	60 22	23	60 13	23	45
10 18	+61 21	22	+61 12	22	+61 3	22	+60 54	22	+60 45	22	+60 36	22	13 42
21	61 43	22	61 34	22	61 25	21	61 16	21	61 7	21	60 58	21	39
24	62 5	21	61 56	21	61 46	21	61 37	21	61 28	21	61 19	21	36
27	62 26	20	62 17	20	62 7	21	61 58	20	61 49	20	61 40	20	33
30	62 46	20	62 37	20	62 28	19	62 18	20	62 9	20	62 0	19	30
10 33	+63 6	19	+62 57	19	+62 47	19	+62 38	19	+62 29	18	+62 19	19	13 27
36	63 25	18	63 16	18	63 6	18	62 57	18	62 47	19	62 38	18	24
39	63 43	18	63 34	18	63 24	18	63 15	18	63 6	17	62 56	18	21
42	64 1	17	63 52	17	63 42	17	63 33	17	63 23	17	63 14	17	18
45	64 18	17	64 9	16	63 59	17	63 50	16	63 40	17	63 31	16	15
10 48	+64 35	16	+64 25	16	+64 16	15	+64 6	16	+63 57	15	+63 47	16	13 12
51	64 51	15	64 41	15	64 31	15	64 22	15	64 12	15	64 3	15	9
54	65 6	14	64 56	15	64 46	15	64 37	14	64 27	15	64 18	14	6
10 57	65 20	14	65 11	13	65 1	14	64 51	14	64 42	13	64 32	14	3
11 0	65 34	13	65 24	14	65 15	13	65 5	13	64 55	13	64 46	13	13 0
11 3	+65 47	13	+65 38	12	+65 28	12	+65 18	13	+65 8	13	+64 59	12	12 57
6	66 0	12	65 50	12	65 40	12	65 31	11	65 21	12	65 11	12	54
9	66 12	11	66 2	11	65 52	11	65 42	11	65 33	11	65 23	11	51
12	66 23	10	66 13	11	66 3	11	65 53	11	65 44	10	65 34	10	48
15	66 33	10	66 24	9	66 14	10	66 4	10	65 54	10	65 44	10	45
11 18	+66 43	9	+66 33	9	+66 24	9	+66 14	9	+66 4	9	+65 54	9	12 42
21	66 52	9	66 42	9	66 33	8	66 23	8	66 13	8	66 3	8	39
24	67 1	8	66 51	8	66 41	8	66 31	8	66 21	8	66 11	8	36
27	67 9	7	66 59	7	66 49	7	66 39	7	66 29	7	66 19	7	33
30	67 16	6	67 6	6	66 56	6	66 46	6	66 36	7	66 26	7	30
11 33	+67 22	6	+67 12	6	+67 2	6	+66 52	6	+66 43	5	+66 33	5	12 27
36	67 28	5	67 18	5	67 8	5	66 58	5	66 48	5	66 38	5	24
39	67 33	5	67 23	5	67 13	5	67 3	5	66 53	5	66 43	5	21
42	67 38	3	67 28	3	67 18	3	67 8	4	66 58	4	66 48	4	18
45	67 41	3	67 31	3	67 21	3	67 12	3	67 2	3	66 52	3	15
11 48	+67 44	3	+67 34	3	+67 24	3	+67 15	2	+67 5	2	+66 55	2	12 12
51	67 47	2	67 37	2	67 27	2	67 17	2	67 7	2	66 57	2	9
54	67 49	1	67 39	1	67 29	1	67 19	1	67 9	1	66 59	1	6
11 57	67 50	0	67 40	0	67 30	0	67 20	0	67 10	0	67 0	0	3
12 0	+67 50		+67 40		+67 30		+67 20		+67 10		+67 0		12 0

TABLE Ia.

Table I has been computed for an altitude of 45°. For other altitudes, corrections taken from the following table may be applied when the desired degree of accuracy requires it.

H. A.	Altitude.	10°	20°	30°	40°	50°	60°	70°	Altitude.	H. A.
h	h	″	″	″	″	″	″	″	h	h
0	12	0	0	0	0	0	0	0	12	24
1	11	− 2	− 2	− 1	0	+1	+ 2	+ 5	13	23
2	10	8	6	4	−2	2	7	17	14	22
3	9	16	13	8	3	4	14	35	15	21
4	8	24	19	13	5	6	22	52	16	20
5	7	30	23	16	6	7	27	65	17	19
6	6	−33	−25	−17	−6	+8	+29	+69	18	18

INTO MEAN SOLAR TIME.

TO BE FROM A TIME

INTO MEAN SOLAR TIME.

TO BE FROM A SIDEREAL TIME

INTO MEAN SOLAR TIME.

TO BE FROM A SIDEREAL TIME INTERVAL.

MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME

TABLE III.

MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME INTERVAL.

Mean Solar.	8^h	9^h	10^h	11^h	12^h	13^h	14^h	15^h	Per Seconds.	
m	m s	m s	m s	m s	m s	m s	m s	m s	s	s
0	1 18.852	1 28.708	1 38.565	1 48.421	1 58.278	2 8.134	2 17.991	2 27.847	0	0.000
1	1 19.016	1 28.873	1 38.729	1 48.585	1 58.442	2 8.298	2 18.155	2 28.011	1	0.003
2	1 19.180	1 29.037	1 38.893	1 48.750	1 58.606	2 8.463	2 18.319	2 28.176	2	0.005
3	1 19.345	1 29.201	1 39.058	1 48.914	1 58.771	2 8.627	2 18.483	2 28.340	3	0.008
4	1 19.509	1 29.365	1 39.222	1 49.078	1 58.935	2 8.791	2 18.648	2 28.504	4	0.011
5	1 19.673	1 29.530	1 39.386	1 49.243	1 59.099	2 8.956	2 18.812	2 28.668	5	0.014
6	1 19.837	1 29.694	1 39.550	1 49.407	1 59.263	2 9.120	2 18.976	2 28.833	6	0.016
7	1 20.002	1 29.858	1 39.715	1 49.571	1 59.428	2 9.284	2 19.141	2 28.997	7	0.019
8	1 20.166	1 30.022	1 39.879	1 49.735	1 59.592	2 9.448	2 19.305	2 29.161	8	0.022
9	1 20.330	1 30.187	1 40.043	1 49.900	1 59.756	2 9.613	2 19.469	2 29.326	9	0.025
10	1 20.495	1 30.351	1 40.207	1 50.064	1 59.920	2 9.777	2 19.633	2 29.490	10	0.027
11	1 20.659	1 30.515	1 40.372	1 50.228	2 0.085	2 9.941	2 19.798	2 29.654	11	0.030
12	1 20.823	1 30.680	1 40.536	1 50.393	2 0.249	2 10.105	2 19.962	2 29.818	12	0.033
13	1 20.987	1 30.844	1 40.700	1 50.557	2 0.413	2 10.270	2 20.126	2 29.983	13	0.036
14	1 21.152	1 31.008	1 40.865	1 50.721	2 0.578	2 10.434	2 20.290	2 30.147	14	0.038
15	1 21.316	1 31.172	1 41.029	1 50.885	2 0.742	2 10.598	2 20.455	2 30.311	15	0.041
16	1 21.480	1 31.337	1 41.193	1 51.050	2 0.906	2 10.763	2 20.619	2 30.476	16	0.044
17	1 21.644	1 31.501	1 41.357	1 51.214	2 1.070	2 10.927	2 20.783	2 30.640	17	0.047
18	1 21.809	1 31.665	1 41.522	1 51.378	2 1.235	2 11.091	2 20.948	2 30.804	18	0.049
19	1 21.973	1 31.829	1 41.686	1 51.542	2 1.399	2 11.255	2 21.112	2 30.968	19	0.052
20	1 22.137	1 31.994	1 41.850	1 51.707	2 1.563	2 11.420	2 21.276	2 31.133	20	0.055
21	1 22.302	1 32.158	1 42.015	1 51.871	2 1.727	2 11.584	2 21.440	2 31.297	21	0.057
22	1 22.466	1 32.322	1 42.179	1 52.035	2 1.892	2 11.748	2 21.605	2 31.461	22	0.060
23	1 22.630	1 32.487	1 42.343	1 52.200	2 2.056	2 11.912	2 21.769	2 31.625	23	0.063
24	1 22.794	1 32.651	1 42.507	1 52.364	2 2.220	2 12.077	2 21.933	2 31.790	24	0.066
25	1 22.959	1 32.815	1 42.672	1 52.528	2 2.385	2 12.241	2 22.098	2 31.954	25	0.068
26	1 23.123	1 32.979	1 42.836	1 52.692	2 2.549	2 12.405	2 22.262	2 32.118	26	0.071
27	1 23.287	1 33.144	1 43.000	1 52.857	2 2.713	2 12.570	2 22.426	2 32.283	27	0.074
28	1 23.451	1 33.308	1 43.164	1 53.021	2 2.877	2 12.734	2 22.590	2 32.447	28	0.077
29	1 23.616	1 33.472	1 43.329	1 53.185	2 3.042	2 12.898	2 22.755	2 32.611	29	0.079
30	1 23.780	1 33.637	1 43.493	1 53.349	2 3.206	2 13.062	2 22.919	2 32.775	30	0.082
31	1 23.944	1 33.801	1 43.657	1 53.514	2 3.370	2 13.227	2 23.083	2 32.940	31	0.085
32	1 24.109	1 33.965	1 43.822	1 53.678	2 3.534	2 13.391	2 23.247	2 33.104	32	0.088
33	1 24.273	1 34.129	1 43.986	1 53.842	2 3.699	2 13.555	2 23.412	2 33.268	33	0.090
34	1 24.437	1 34.294	1 44.150	1 54.007	2 3.863	2 13.720	2 23.576	2 33.432	34	0.093
35	1 24.601	1 34.458	1 44.314	1 54.171	2 4.027	2 13.884	2 23.740	2 33.597	35	0.096
36	1 24.766	1 34.622	1 44 479	1 54.335	2 4.192	2 14.048	2 23.905	2 33.761	36	0.099
37	1 24.930	1 34.786	1 44.643	1 54.499	2 4.356	2 14.212	2 24.069	2 33.925	37	0.101
38	1 25.094	1 34.951	1 44.807	1 54.664	2 4.520	2 14.377	2 24.233	2 34.090	38	0.104
39	1 25.259	1 35.115	1 44.971	1 54.828	2 4.684	2 14.541	2 24.397	2 34.254	39	0.107
40	1 25.423	1 35.279	1 45.136	1 54.992	2 4.849	2 14.705	2 24.562	2 34.418	40	0.110
41	1 25.587	1 35.444	1 45.300	1 55.156	2 5.013	2 14.869	2 24.726	2 34.582	41	0.112
42	1 25.751	1 35.608	1 45.464	1 55.321	2 5.177	2 15.034	2 24.890	2 34.747	42	0.115
43	1 25.916	1 35.772	1 45.629	1 55.485	2 5.342	2 15.198	2 25.054	2 34.911	43	0.118
44	1 26.080	1 35.936	1 45.793	1 55.649	2 5.506	2 15.362	2 25.219	2 35.075	44	0.120
45	1 26.244	1 36.101	1 45.957	1 55.814	2 5.670	2 15.527	2 25.383	2 35.239	45	0.123
46	1 26.408	1 36.265	1 46.121	1 55.978	2 5.834	2 15.691	2 25.547	2 35.404	46	0.126
47	1 26.573	1 36.429	1 46.286	1 56.142	2 5.999	2 15.855	2 25.712	2 35.568	47	0.129
48	1 26.737	1 36.593	1 46.450	1 56.306	2 6.163	2 16.019	2 25.876	2 35.732	48	0.131
49	1 26.901	1 36.758	1 46.614	1 56.471	2 6.327	2 16.184	2 26.040	2 35.897	49	0.134
50	1 27.066	1 36.922	1 46.778	1 56.635	2 6.491	2 16.348	2 26.204	2 36.061	50	0.137
51	1 27.230	1 37.086	1 46.943	1 56.799	2 6.656	2 16.512	2 26.369	2 36.225	51	0.140
52	1 27.394	1 37.251	1 47.107	1 56.964	2 6.820	2 16.676	2 26.533	2 36.389	52	0.142
53	1 27.558	1 37.415	1 47.271	1 57.128	2 6.984	2 16.841	2 26.697	2 36.554	53	0.145
54	1 27.723	1 37.579	1 47.436	1 57.292	2 7.149	2 17.005	2 26.861	2 36.718	54	0.148
55	1 27.887	1 37.743	1 47.600	1 57.456	2 7.313	2 17.169	2 27.026	2 36.882	55	0.151
56	1 28.051	1 37.908	1 47.764	1 57.621	2 7.477	2 17.334	2 27.190	2 37.047	56	0.153
57	1 28.215	1 38.072	1 47.928	1 57.785	2 7.641	2 17.498	2 27.354	2 37.211	57	0.156
58	1 28.380	1 38.236	1 48.093	1 57.949	2 7.806	2 17.662	2 27.519	2 37.375	58	0.159
59	1 28.544	1 38.400	1 48.257	1 58.113	2 7.970	2 17.826	2 27.683	2 37.5[illegible]	59	[illegible]

MEAN SOLAR INTO SIDEREAL TIME.

TO BE ADDED TO A MEAN TIME

TABLE IV.

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1919.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

Lat. / H. A.	10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat. / H. A.
h m	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h m
0 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24 0
10	0 3.0	0 3.0	0 3.1	0 3.2	0 3.2	0 3.3	0 3.4	0 3.4	0 3.5	23 50
20	0 6.0	0 6.1	0 6.3	0 6.4	0 6.5	0 6.6	0 6.7	0 6.8	0 7.0	40
0 30	0 9.0	0 9.1	0 9.4	0 9.6	0 9.7	0 9.9	0 10.1	0 10.3	0 10.5	23 30
40	0 11.9	0 12.2	0 12.5	0 12.7	0 12.9	0 13.1	0 13.4	0 13.6	0 13.9	20
50	0 14.8	0 15.2	0 15.6	0 15.8	0 16.1	0 16.4	0 16.7	0 17.0	0 17.4	10
1 0	0 17.7	0 18.1	0 18.7	0 18.9	0 19.2	0 19.6	0 19.9	0 20.3	0 20.8	23 0
10	0 20.6	0 21.1	0 21.7	0 22.0	0 22.3	0 22.7	0 23.1	0 23.6	0 24.2	22 50
20	0 23.5	0 24.0	0 24.7	0 25.0	0 25.4	0 25.8	0 26.8	0 26.9	0 27.5	40
1 30	0 26.3	0 26.8	0 27.6	0 28.0	0 28.4	0 28.9	0 29.5	0 30.1	0 30.7	22 30
40	0 29.0	0 29.6	0 30.5	0 30.9	0 31.4	0 31.9	0 32.5	0 33.2	0 33.9	20
50	0 31.7	0 32.3	0 33.3	0 33.8	0 34.3	0 34.9	0 35.5	0 36.3	0 37.0	10
2 0	0 34.3	0 35.0	0 36.0	0 36.6	0 37.1	0 37.8	0 38.5	0 39.3	0 40.1	22 0
10	0 36.8	0 37.6	0 38.7	0 39.3	0 39.9	0 40.6	0 41.3	0 42.2	0 43.1	21 50
20	0 39.3	0 40.2	0 41.3	0 41.9	0 42.6	0 43.3	0 44.1	0 45.0	0 46.0	40
2 30	0 41.7	0 42.6	0 43.9	0 44.5	0 45.2	0 46.0	0 46.8	0 47.8	0 48.8	21 30
40	0 44.1	0 45.0	0 46.3	0 47.0	0 47.7	0 48.5	0 49.4	0 50.4	0 51.5	20
50	0 46.3	0 47.3	0 48.7	0 49.4	0 50.1	0 51.0	0 51.9	0 53.0	0 54.1	10
3 0	0 48.5	0 49.5	0 50.9	0 51.6	0 52.4	0 53.3	0 54.3	0 55.4	0 56.6	21 0
10	0 50.5	0 51.6	0 53.1	0 53.8	0 54.7	0 55.6	0 56.6	0 57.7	0 59.0	20 50
20	0 52.5	0 53.6	0 55.2	0 55.9	0 56.8	0 57.7	0 58.8	1 0.0	1 1.3	40
3 30	0 54.4	0 55.5	0 57.1	0 57.9	0 58.8	0 59.8	1 0.9	1 2.1	1 3.5	20 30
40	0 56.1	0 57.3	0 58.9	0 59.8	1 0.7	1 1.7	1 2.9	1 4.1	1 5.5	20
50	0 57.8	0 59.0	1 0.7	1 1.5	1 2.5	1 3.5	1 4.7	1 6.0	1 7.4	10
4 0	0 59.3	1 0.5	1 2.3	1 3.1	1 4.1	1 5.2	1 6.4	1 7.7	1 9.2	20 0
10	1 0.7	1 2.0	1 3.8	1 4.6	1 5.6	1 6.7	1 8.0	1 9.3	1 10.8	19 50
20	1 2.1	1 3.3	1 5.1	1 6.0	1 7.0	1 8.2	1 9.4	1 10.8	1 12.3	40
4 30	1 3.3	1 4.5	1 6.4	1 7.3	1 8.3	1 9.5	1 10.7	1 12.1	1 13.7	19 30
40	1 4.3	1 5.6	1 7.5	1 8.4	1 9.5	1 10.6	1 11.9	1 13.3	1 14.9	20
50	1 5.3	1 6.6	1 8.5	1 9.4	1 10.5	1 11.6	1 13.0	1 14.4	1 16.0	10
5 0	1 6.1	1 7.4	1 9.3	1 10.3	1 11.4	1 12.5	1 13.9	1 15.3	1 16.9	19 0
10	1 6.8	1 8.1	1 10.1	1 11.0	1 12.1	1 13.3	1 14.6	1 16.1	1 17.7	18 50
20	1 7.4	1 8.7	1 10.7	1 11.6	1 12.7	1 13.9	1 15.2	1 16.7	1 18.3	40
5 30	1 7.8	1 9.2	1 11.1	1 12.1	1 13.2	1 14.4	1 15.7	1 17.2	1 18.8	18 30
40	1 8.1	1 9.5	1 11.4	1 12.4	1 13.5	1 14.7	1 16.0	1 17.5	1 19.2	20
50	1 8.3	1 9.7	1 11.6	1 12.6	1 13.7	1 14.9	1 16.2	1 17.7	1 19.4	10
6 0	1 8.4	1 9.7	1 11.7	1 12.6	1 13.7	1 14.9	1 16.3	1 17.7	1 19.4	18 0
10	1 8.3	1 9.6	1 11.6	1 12.5	1 13.6	1 14.8	1 16.2	1 17.6	1 19.3	17 50
20	1 8.1	1 9.4	1 11.3	1 12.3	1 13.4	1 14.6	1 15.9	1 17.4	1 19.0	40
6 30	1 7.8	1 9.1	1 11.0	1 11.9	1 13.0	1 14.2	1 15.5	1 17.0	1 18.6	17 30
40	1 7.3	1 8.6	1 10.5	1 11.4	1 12.5	1 13.7	1 15.0	1 16.4	1 18.0	20
50	1 6.7	1 8.0	1 9.9	1 10.8	1 11.8	1 13.0	1 14.3	1 15.7	1 17.3	10
7 0	1 6.0	1 7.2	1 9.1	1 10.0	1 11.0	1 12.2	1 13.5	1 14.9	1 16.4	17 0
10	1 5.2	1 6.4	1 8.2	1 9.1	1 10.1	1 11.2	1 12.5	1 13.9	1 15.4	16 50
20	1 4.2	1 5.4	1 7.2	1 8.1	1 9.0	1 10.2	1 11.4	1 12.8	1 14.3	40
7 30	1 3.1	1 4.3	1 6.0	1 6.9	1 7.9	1 9.0	1 10.2	1 11.5	1 13.0	16 30
40	1 1.9	1 3.0	1 4.7	1 5.6	1 6.6	1 7.6	1 8.8	1 10.1	1 11.6	20
50	1 0.6	1 1.7	1 3.3	1 4.2	1 5.1	1 6.2	1 7.3	1 8.6	1 10.0	10
8 0	0 59.1	1 0.2	1 1.8	1 2.6	1 3.6	1 4.6	1 5.7	1 7.0	1 8.3	16 0
10	0 57.6	0 58.6	1 0.2	1 1.0	1 1.9	1 2.9	1 4.0	1 5.2	1 6.5	15 50
20	0 55.9	0 56.9	0 58.5	0 59.2	1 0.1	1 1.0	1 2.1	1 3.3	1 4.6	40
8 30	0 54.1	0 55.1	0 56.6	0 57.3	0 58.2	0 59.1	1 0.1	1 1.3	1 2.5	15 30
40	0 52.3	0 53.2	0 54.6	0 55.3	0 56.1	0 57.0	0 58.0	0 59.1	1 0.3	20
50	0 50.3	0 51.2	0 52.6	0 53.2	0 54.0	0 54.9	0 55.8	0 56.9	0 58.0	10
9 0	0 48.2	0 49.1	0 50.4	0 51.1	0 51.8	0 52.6	0 53.5	0 54.5	0 55.7	15 0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1919.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

H. A. \ Lat.	10°	15°	20°	22°	24°	26°	28°	30°	32°	Lat. / H. A.
h m	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h m
9 0	0 48.2	0 49.1	0 50.4	0 51.1	0 51.8	0 52.6	0 53.5	0 54.5	0 55.7	15 0
10	0 46.1	0 46.9	0 48.1	0 48.8	0 49.5	0 50.2	0 51.1	0 52.1	0 53.2	14 50
20	0 43.8	0 44.6	0 45.8	0 46.4	0 47.0	0 47.8	0 48.6	0 49.5	0 50.6	40
9 30	0 41.5	0 42.3	0 43.4	0 43.9	0 44.6	0 45.3	0 46.0	0 46.9	0 47.9	14 30
40	0 39.1	0 39.8	0 40.9	0 41.4	0 42.0	0 42.6	0 43.4	0 44.2	0 45.1	20
50	0 36.6	0 37.3	0 38.3	0 38.8	0 39.3	0 39.9	0 40.6	0 41.4	0 42.2	10
10 0	0 34.1	0 34.7	0 35.6	0 36.1	0 36.6	0 37.2	0 37.8	0 38.5	0 39.3	14 0
10	0 31.5	0 32.0	0 32.9	0 33.3	0 33.8	0 34.3	0 34.9	0 35.5	0 36.3	13 50
20	0 28.8	0 29.3	0 30.1	0 30.5	0 30.9	0 31.4	0 31.9	0 32.5	0 33.2	40
10 30	0 26.1	0 26.5	0 27.2	0 27.6	0 28.0	0 28.4	0 28.9	0 29.4	0 30.0	13 30
40	0 23.3	0 23.7	0 24.3	0 24.7	0 25.0	0 25.4	0 25.8	0 26.3	0 26.8	20
50	0 20.5	0 20.8	0 21.4	0 21.7	0 22.0	0 22.3	0 22.7	0 23.1	0 23.6	10
11 0	0 17.7	0 17.9	0 18.4	0 18.7	0 18.9	0 19.2	0 19.5	0 19.9	0 20.3	13 0
10	0 14.8	0 15.0	0 15.4	0 15.6	0 15.8	0 16.1	0 16.3	0 16.6	0 17.0	12 50
20	0 11.8	0 12.1	0 12.3	0 12.5	0 12.7	0 12.9	0 13.1	0 13.3	0 13.6	40
11 30	0 8.9	0 9.1	0 9.3	0 9.4	0 9.5	0 9.7	0 9.8	0 10.0	0 10.2	12 30
40	0 5.9	0 6.0	0 6.2	0 6.3	0 6.4	0 6.5	0 6.6	0 6.7	0 6.8	20
50	0 3.0	0 3.0	0 3.1	0 3.1	0 3.2	0 3.2	0 3.3	0 3.4	0 3.4	10
12 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12 0

H. A. \ Lat.	32°	34°	36°	38°	40°	42°	44°	46°	48°	Lat. / H. A.
h m	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h m
0 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	24 0
10	0 3.5	0 3.6	0 3.7	0 3.8	0 3.9	0 4.0	0 4.2	0 4.3	0 4.5	23 50
20	0 7.0	0 7.2	0 7.4	0 7.6	0 7.8	0 8.0	0 8.3	0 8.6	0 9.0	40
0 30	0 10.5	0 10.7	0 11.0	0 11.3	0 11.7	0 12.1	0 12.5	0 12.9	0 13.4	23 30
40	0 13.9	0 14.3	0 14.7	0 15.1	0 15.5	0 16.0	0 16.6	0 17.2	0 17.8	20
50	0 17.4	0 17.8	0 18.3	0 18.8	0 19.3	0 20.0	0 20.7	0 21.4	0 22.2	10
1 0	0 20.8	0 21.3	0 21.8	0 22.4	0 23.1	0 23.9	0 24.7	0 25.6	0 26.6	23 0
10	0 24.2	0 24.7	0 25.3	0 26.0	0 26.8	0 27.7	0 28.7	0 29.7	0 30.9	22 50
20	0 27.5	0 28.1	0 28.8	0 29.6	0 30.5	0 31.5	0 32.6	0 33.8	0 35.1	40
1 30	0 30.7	0 31.4	0 32.2	0 33.1	0 34.1	0 35.2	0 36.4	0 37.8	0 39.3	22 30
40	0 33.9	0 34.7	0 35.6	0 36.6	0 37.7	0 38.9	0 40.2	0 41.7	0 43.4	20
50	0 37.0	0 37.9	0 38.9	0 40.0	0 41.2	0 42.5	0 44.0	0 45.6	0 47.4	10
2 0	0 40.1	0 41.1	0 42.1	0 43.3	0 44.6	0 46.0	0 47.6	0 49.4	0 51.3	22 0
10	0 43.1	0 44.1	0 45.2	0 46.5	0 47.9	0 49.4	0 51.1	0 53.0	0 55.1	21 50
20	0 46.0	0 47.1	0 48.3	0 49.6	0 51.1	0 52.7	0 54.5	0 56.5	0 58.8	40
2 30	0 48.8	0 50.0	0 51.2	0 52.6	0 54.2	0 55.9	0 57.8	1 0.0	1 2.3	21 30
40	0 51.5	0 52.7	0 54.1	0 55.6	0 57.2	0 59.0	1 1.0	1 3.3	1 5.8	20
50	0 54.1	0 55.4	0 56.8	0 58.4	1 0.1	1 2.0	1 4.1	1 6.5	1 9.1	10
3 0	0 56.6	0 58.0	0 59.4	1 1.1	1 2.9	1 4.9	1 7.1	1 9.6	1 12.3	21 0
10	0 59.0	1 0.4	1 1.9	1 3.6	1 5.5	1 7.6	1 9.9	1 12.5	1 15.3	20 50
20	1 1.3	1 2.7	1 4.3	1 6.1	1 8.0	1 10.2	1 12.6	1 15.2	1 18.2	40
3 30	1 3.5	1 4.9	1 6.6	1 8.4	1 10.4	1 12.7	1 15.1	1 17.8	1 20.9	20 30
40	1 5.5	1 7.0	1 8.7	1 10.6	1 12.7	1 15.0	1 17.5	1 20.3	1 23.5	20
50	1 7.4	1 9.0	1 10.7	1 12.7	1 14.8	1 17.2	1 19.7	1 22.6	1 25.9	10
4 0	1 9.2	1 10.8	1 12.6	1 14.6	1 16.8	1 19.2	1 21.8	1 24.8	1 28.1	20 0
10	1 10.8	1 12.5	1 14.3	1 16.3	1 18.6	1 21.0	1 23.7	1 26.8	1 30.2	19 50
20	1 12.3	1 14.0	1 15.9	1 17.9	1 20.2	1 22.7	1 25.5	1 28.6	1 32.0	40
4 30	1 13.7	1 15.4	1 17.3	1 19.4	1 21.7	1 24.3	1 27.1	1 30.3	1 33.7	19 30
40	1 14.9	1 16.7	1 18.6	1 20.7	1 23.1	1 25.7	1 28.5	1 31.7	1 35.3	20
50	1 16.0	1 17.8	1 19.7	1 21.9	1 24.3	1 26.9	1 29.7	1 33.0	1 36.8	10
5 0	1 16.9	1 18.7	1 20.7	1 22.9	1 25.3	1 27.9	1 30.8	1 34.1	1 37.7	19 0

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1919.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

H. A. \ Lat.	48°	50°	52°	54°	56°	58°	60°	61°	62°	Lat. / H. A.
h m	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h m
1 0	0 26.6	0 27.7	0 29.0	0 30.4	0 32.1	0 33.9	0 36.0	0 37.2	0 38.5	23 0
10	0 30.9	0 32.2	0 33.7	0 35.3	0 37.2	0 39.4	0 41.9	0 43.2	0 44.7	22 50
20	0 35.1	0 36.6	0 38.3	0 40.2	0 42.3	0 44.8	0 47.6	0 49.1	0 50.8	40
1 30	0 39.3	0 41.0	0 42.8	0 45.0	0 47.3	0 50.1	0 53.2	0 54.9	0 56.8	22 30
40	0 43.4	0 45.2	0 47.3	0 49.6	0 52.3	0 55.3	0 58.7	1 0.6	1 2.7	20
50	0 47.4	0 49.4	0 51.7	0 54.2	0 57.1	1 0.4	1 4.1	1 6.2	1 8.5	10
2 0	0 51.3	0 53.5	0 55.9	0 58.7	1 1.8	1 5.3	1 9.4	1 11.6	1 14.1	22 0
10	0 55.1	0 57.4	1 0.0	1 3.0	1 6.3	1 10.1	1 14.5	1 16.9	1 19.5	21 50
20	0 58.8	1 1.2	1 4.0	1 7.2	1 10.7	1 14.8	1 19.4	1 22.0	1 24.8	40
2 30	1 2.3	1 5.0	1 7.9	1 11.3	1 15.0	1 19.3	1 24.2	1 27.0	1 29.9	21 30
40	1 5.8	1 8.6	1 11.7	1 15.2	1 19.2	1 23.7	1 28.9	1 31.7	1 34.8	20
50	1 9.1	1 12.0	1 15.3	1 19.0	1 23.1	1 27.9	1 33.3	1 36.3	1 39.6	10
3 0	1 12.3	1 15.3	1 18.7	1 22.6	1 26.9	1 31.9	1 37.6	1 40.7	1 44.1	21 0
10	1 15.3	1 18.5	1 22.0	1 26.0	1 30.5	1 35.7	1 41.6	1 44.9	1 48.4	20 50
20	1 18.2	1 21.5	1 25.1	1 29.3	1 34.0	1 39.3	1 45.4	1 48.8	1 52.5	40
3 30	1 20.9	1 24.3	1 28.1	1 32.4	1 37.2	1 42.7	1 49.1	1 52.6	1 56.4	20 30
40	1 23.5	1 27.0	1 30.9	1 35.3	1 40.3	1 46.0	1 52.5	1 56.1	2 0.0	20
50	1 25.9	1 29.5	1 33.5	1 38.0	1 43.2	1 49.0	1 55.7	1 59.4	2 3.4	10
4 0	1 28.1	1 31.8	1 35.9	1 40.6	1 45.8	1 51.8	1 58.6	2 2.4	2 6.5	20 0
10	1 30.2	1 33.9	1 38.1	1 42.9	1 48.2	1 54.3	2 1.3	2 5.2	2 9.4	19 50
20	1 32.0	1 35.9	1 40.2	1 45.0	1 50.4	1 56.7	2 3.8	2 7.7	2 12.0	40
4 30	1 33.7	1 37.6	1 42.0	1 46.9	1 52.5	1 58.8	2 6.0	2 10.0	2 14.4	19 30
40	1 35.3	1 39.2	1 43.6	1 48.6	1 54.3	2 0.7	2 8.0	2 12.1	2 16.5	20
50	1 36.6	1 40.6	1 45.1	1 50.1	1 55.8	2 2.3	2 9.7	2 13.8	2 18.3	10
5 0	1 37.7	1 41.8	1 46.3	1 51.4	1 57.2	2 3.7	2 11.2	2 15.3	2 19.8	19 0
10	1 38.7	1 42.8	1 47.3	1 52.5	1 58.3	2 4.9	2 12.4	2 16.6	2 21.1	18 50
20	1 39.5	1 43.6	1 48.2	1 53.3	1 59.2	2 5.8	2 13.4	2 17.6	2 22.1	40
5 30	1 40.0	1 44.2	1 48.8	1 54.0	1 59.8	2 6.5	2 14.1	2 18.3	2 22.8	18 30
40	1 40.4	1 44.6	1 49.2	1 54.4	2 0.2	2 6.9	2 14.5	2 18.7	2 23.3	20
50	1 40.6	1 44.8	1 49.4	1 54.6	2 0.4	2 7.1	2 14.7	2 18.9	2 23.5	10
6 0	1 40.6	1 44.7	1 49.3	1 54.5	2 0.4	2 7.0	2 14.6	2 18.8	2 23.4	18 0
10	1 40.4	1 44.5	1 49.1	1 54.3	2 0.1	2 6.7	2 14.3	2 18.5	2 23.0	17 50
20	1 40.1	1 44.1	1 48.7	1 53.9	1 59.6	2 6.2	2 13.7	2 17.9	2 22.3	40
6 30	1 39.5	1 43.5	1 48.1	1 53.2	1 58.9	2 5.4	2 12.9	2 17.0	2 21.4	17 30
40	1 38.7	1 42.7	1 47.2	1 52.3	1 58.0	2 4.4	2 11.8	2 15.9	2 20.3	20
50	1 37.7	1 41.7	1 46.2	1 51.2	1 56.8	2 3.2	2 10.5	2 14.5	2 18.9	10
7 0	1 36.6	1 40.6	1 44.9	1 49.9	1 55.4	2 1.7	2 8.9	2 12.9	2 17.2	17 0
10	1 35.3	1 39.2	1 43.5	1 48.3	1 53.8	2 0.0	2 7.1	2 11.0	2 15.2	16 50
20	1 33.9	1 37.6	1 41.9	1 46.6	1 52.0	1 58.1	2 5.1	2 8.9	2 13.0	40
7 30	1 32.2	1 35.9	1 40.1	1 44.7	1 50.0	1 56.0	2 2.8	2 6.6	2 10.6	16 30
40	1 30.4	1 34.0	1 38.1	1 42.6	1 47.8	1 53.6	2 0.3	2 4.0	2 7.9	20
50	1 28.4	1 31.9	1 35.9	1 40.3	1 45.4	1 51.1	1 57.6	2 1.2	2 5.0	10
8 0	1 26.2	1 29.7	1 33.5	1 37.9	1 42.8	1 48.3	1 54.6	1 58.2	2 1.9	16 0
10	1 23.9	1 27.3	1 31.0	1 35.2	1 40.0	1 45.4	1 51.5	1 54.9	1 58.6	15 50
20	1 21.4	1 24.7	1 28.3	1 32.4	1 37.0	1 42.2	1 48.2	1 51.5	1 55.0	40
8 30	1 18.8	1 21.9	1 25.4	1 29.4	1 33.9	1 38.9	1 44.7	1 47.8	1 51.3	15 30
40	1 16.0	1 19.0	1 22.4	1 26.3	1 30.6	1 35.4	1 40.9	1 44.0	1 47.3	20
50	1 13.1	1 16.0	1 19.3	1 23.0	1 27.1	1 31.7	1 37.0	1 40.0	1 43.2	10
9 0	1 10.1	1 12.9	1 16.0	1 19.5	1 23.4	1 27.9	1 33.0	1 35.8	1 38.8	15 0
10	1 6.9	1 9.6	1 12.5	1 15.9	1 19.6	1 23.9	1 28.7	1 31.4	1 34.3	14 50
20	1 3.6	1 6.1	1 9.0	1 12.2	1 15.7	1 19.8	1 24.3	1 26.9	1 29.6	40
9 30	1 0.2	1 2.6	1 5.3	1 8.3	1 11.6	1 15.5	1 19.8	1 22.2	1 24.8	14 30
40	0 56.7	0 58.9	1 1.5	1 4.3	1 7.4	1 11.0	1 15.1	1 17.4	1 19.8	20
50	0 53.1	0 55.2	0 57.6	1 0.2	1 3.1	1 6.5	1 10.3	1 12.5	1 14.7	10
10 0	*0 49.4*	*0 51.3*	0 53.5	0 56.0	0 58.7	1 1.9	1 5.4	1 7.4	1 9.5	14 0

TABLE IV.

AZIMUTH OF POLARIS AT ALL HOUR ANGLES, 1919.

[For hour angles 0^h to 12^h the star is west of north, and for hour angles 12^h to 24^h it is east of north.]

H. A. \ Lat.	62°	63°	64°	65°	66°	67°	68°	69°	70°	Lat. / H. A.
h m	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	h m
6 0	2 23.4	2 28.2	2 33.5	2 39.2	2 45.4	2 52.2	2 59.6	3 7.7	3 16.7	18 0
10	2 23.0	2 27.8	2 33.1	2 38.8	2 45.0	2 51.7	2 59.1	3 7.1	3 16.0	17 50
20	2 22.3	2 27.2	2 32.4	2 38.0	2 44.2	2 50.9	2 58.2	3 6.2	3 15.0	40
6 30	2 21.4	2 26.2	2 31.4	2 37.0	2 43.1	2 49.7	2 56.9	3 4.9	3 13.6	17 30
40	2 20.3	2 25.0	2 30.1	2 35.7	2 41.7	2 48.2	2 55.4	3 3.3	3 11.9	20
50	2 18.9	2 23.5	2 28.6	2 34.1	2 40.0	2 46.5	2 53.5	3 1.3	3 9.8	10
7 0	2 17.2	2 21.8	2 26.7	2 32.2	2 38.0	2 44.4	2 51.3	2 59.0	3 7.4	17 0
10	2 15.2	2 19.8	2 24.7	2 30.0	2 35.7	2 42.0	2 48.8	2 56.3	3 4.6	16 50
20	2 13.0	2 17.5	2 22.3	2 27.5	2 33.2	2 39.3	2 46.0	2 53.4	3 1.5	40
7 30	2 10.6	2 15.0	2 19.7	2 24.8	2 30.3	2 36.3	2 42.9	2 50.1	2 58.1	16 30
40	2 7.9	2 12.2	2 16.8	2 21.8	2 27.2	2 33.1	2 39.5	2 46.6	2 54,3	20
50	2 5.0	2 9.2	2 13.7	2 18.6	2 23.8	2 29.6	2 35.9	2 42.7	2 50.3	10
8 0	2 1.9	2 6.0	2 10.4	2 15.1	2 20.2	2 25.8	2 31.9	2 38.6	2 45.9	16 0
10	1 58.6	2 2.5	2 6.8	2 11.4	2 16.3	2 21.8	2 27.7	2 34.2	2 41.3	15 50
20	1 55.0	1 58.8	2 3.0	2 7.4	2 12.2	2 17.5	2 23.2	2 29.4	2 36.4	40
8 30	1 51.3	1 55.0	1 58.9	2 3.2	2 7.9	2 12.9	2 18.5	2 24.5	2 31.2	15 30
40	1 47.3	1 50.9	1 54.7	1 58.8	2 3.3	2 8.2	2 13.5	2 19.3	2 25.7	20
50	1 43.2	1 46.6	1 50.2	1 54.2	1 58.5	2 3.2	2 8.3	2 13.9	2 20.0	10
9 0	1 38.8	1 42.1	1 45.6	1 49.4	1 53.5	1 58.0	2 2.9	2 8.2	2 14.1	15 0
10	1 34.3	1 37.4	1 40.8	1 44.4	1 48.3	1 52.6	1 57.2	2 2.3	2 7.9	14 50
20	1 29.6	1 32.6	1 35.8	1 39.2	1 42.9	1 47.0	1 51.4	1 56.2	2 1.5	40
9 30	1 24.8	1 27.6	1 30.6	1 33.9	1 37.4	1 41.2	1 45.4	1 49.9	1 54.9	14 30
40	1 19.8	1 22.5	1 25.3	1 28.4	1 31.7	1 35.2	1 39.2	1 43.4	1 48.1	20
50	1 14.7	1 17.2	1 19.8	1 22.7	1 25.8	1 29.1	1 32.8	1 36.8	1 41.2	10
10 0	1 9.5	1 11.8	1 14.2	1 16.9	1 19.7	1 22.8	1 26.2	1 30.0	1 34.1	14 0
10	1 4.1	1 6.2	1 8.5	1 10.9	1 13.6	1 16.4	1 19.6	1 23.0	1 26.8	13 50
20	0 58.7	1 0.6	1 2.6	1 4.9	1 7.3	1 9.9	1 12.8	1 15.9	1 19.4	40
10 30	0 53.1	0 54.8	0 56.7	0 58.7	1 0.9	1 3.3	1 5.8	1 8.7	1 11.8	13 30
40	0 47.4	0 49.0	0 50.6	0 52.4	0 54.4	0 56.5	0 58.8	1 1.3	1 4.1	20
50	0 41.7	0 43.0	0 44.5	0 46.1	0 47.8	0 49.6	0 51.7	0 53.9	0 56.3	10
11 0	0 35.9	0 37.0	0 38.3	0 39.6	0 41.1	0 42.7	0 44.4	0 46.3	0 48.4	13 0
10	0 30.0	0 30.9	0 32.0	0 33.1	0 34.4	0 35.7	0 37.1	0 38.7	0 40.5	12 50
20	0 24.0	0 24.8	0 25.7	0 26.6	0 27.6	0 28.6	0 29.8	0 31.1	0 32.5	40
11 30	0 18.1	0 18.7	0 19.3	0 20.0	0 20.7	0 21.5	0 22.4	0 23.4	0 24.4	12 30
40	0 12.1	0 12.5	0 12.9	0 13.3	0 13.8	0 14.4	0 15.0	0 15.6	0 16.3	20
50	0 6.0	0 6.2	0 6.4	0 6.7	0 6.9	0 7.2	0 7.5	0 7.8	0 8.2	10
12 0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12 0

TABLE IVa.

Table IV has been computed for a declination of 88° 52′ 40″. For other declinations of Polaris the corrections given below should be applied to the Azimuth taken from Table IV.

Decl. \ Azimuth.	0′	20′	40′	60′	80′	100′	120′	140′	160′	180′	200′	Azimuth. / Decl.
° ′ ″	′	′	′	′	′	′	′	′	′	′	′	° ′ ″
88 52 15	0.0	+0.1	+0.2	+0.4	+0.5	+0.6	+0.7	+0.9	+1.0	+1.1	+1.2	88 52 15
88 52 20	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	88 52 20
88 52 25	0.0	+0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88 52 25
88 52 30	0.0	0.0	+0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	88 52 30
88 52 35	0.0	0.0	0.0	+0.1	+0.1	+0.1	+0.1	+0.2	+0.2	+0.2	+0.2	88 52 35
88 52 40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88 52 40
88 52 45	0.0	0.0	0.0	−0.1	−0.1	−0.1	−0.1	−0.2	−0.2	−0.2	−0.2	88 52 45
88 52 50	0.0	0.0	−0.1	−0.1	−0.2	−0.2	−0.3	−0.3	−0.4	−0.4	−0.5	88 52 50
88 52 55	0.0	−0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	88 52 55
88 53 0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	88 53
88 53 5	*0.0*	*−0.1*	*−0.2*	−0.4	−0.5	−0.6	−0.7	−0.9	−1.0	−1.1	−1.2	88 53

AZIMUTH OF POLARIS AT ELONGATION, 1919.

Lat. \ Decl.	88° 52′ 10″	88° 52′ 20″	88° 52′ 30″	88° 52′ 40″	88° 52′ 50″	88° 53′ 0″	Variation for— 1′ of Lat.	Variation for— 1″ of δ.
° ′	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	″	″
30 0	1 18 19.7	1 18 8.2	1 17 56.6	1 17 45.1	1 17 33.5	1 17 22.0	+0.79	−1.15
30 10	1 18 27.7	1 18 16.1	1 18 4.5	1 17 53.0	1 17 41.4	1 17 29.8	0.80	1.16
30 20	1 18 35.7	1 18 24.1	1 18 12.5	1 18 0.9	1 17 49.3	1 17 37.7	0.80	1.16
30 30	1 18 43.7	1 18 32.1	1 18 20.5	1 18 8.9	1 17 57.3	1 17 45.7	0.81	1.16
30 40	1 18 51.8	1 18 40.2	1 18 28.6	1 18 17.0	1 18 5.3	1 17 53.7	0.81	1.16
30 50	1 19 0.0	1 18 48.4	1 18 36.8	1 18 25.1	1 18 13.5	1 18 1.8	+0.82	−1.16
31 0	1 19 8.3	1 18 56.6	1 18 45.0	1 18 33.3	1 18 21.6	1 18 10.0	0.83	1.17
31 10	1 19 16.6	1 19 4.9	1 18 53.3	1 18 41.6	1 18 29.9	1 18 18.2	0.83	1.17
31 20	1 19 25.0	1 19 13.3	1 19 1.6	1 18 49.9	1 18 38.2	1 18 26.5	0.84	1.17
31 30	1 19 33.5	1 19 21.8	1 19 10.1	1 18 58.3	1 18 46.6	1 18 34.9	0.85	1.17
31 40	1 19 42.1	1 19 30.3	1 19 18.6	1 19 6.8	1 18 55.1	1 18 43.3	+0.86	−1.18
31 50	1 19 50.7	1 19 38.9	1 19 27.2	1 19 15.4	1 19 3.6	1 18 51.8	0.86	1.18
32 0	1 19 59.4	1 19 47.6	1 19 35.8	1 19 24.0	1 19 12.2	1 19 0.4	0.87	1.18
32 10	1 20 8.1	1 19 56.3	1 19 44.5	1 19 32.7	1 19 20.9	1 19 9.1	0.88	1.18
32 20	1 20 17.0	1 20 5.1	1 19 53.3	1 19 41.5	1 19 29.6	1 19 17.8	0.88	1.18
32 30	1 20 25.9	1 20 14.0	1 20 2.2	1 19 50.3	1 19 38.4	1 19 26.6	+0.89	−1.19
32 40	1 20 34.9	1 20 23.0	1 20 11.1	1 19 59.2	1 19 47.3	1 19 35.5	0.90	1.19
32 50	1 20 43.9	1 20 32.0	1 20 20.1	1 20 8.2	1 19 56.3	1 19 44.4	0.91	1.19
33 0	1 20 53.1	1 20 41.1	1 20 29.2	1 20 17.3	1 20 5.4	1 19 53.4	0.91	1.19
33 10	1 21 2.3	1 20 50.3	1 20 38.4	1 20 26.4	1 20 14.5	1 20 2.5	0.92	1.20
33 20	1 21 11.5	1 20 59.6	1 20 47.6	1 20 35.6	1 20 23.7	1 20 11.7	+0.93	−1.20
33 30	1 21 20.9	1 21 8.9	1 20 56.9	1 20 44.9	1 20 32.9	1 20 20.9	0.94	1.20
33 40	1 21 30.3	1 21 18.3	1 21 6.3	1 20 54.3	1 20 42.3	1 20 30.3	0.94	1.20
33 50	1 21 39.9	1 21 27.8	1 21 15.8	1 21 3.7	1 20 51.7	1 20 39.7	0.95	1.20
34 0	1 21 49.5	1 21 37.4	1 21 25.3	1 21 13.3	1 21 1.2	1 20 49.1	0.96	1.21
34 10	1 21 59.1	1 21 47.0	1 21 34.9	1 21 22.9	1 21 10.8	1 20 58.7	+0.96	−1.21
34 20	1 22 8.9	1 21 56.8	1 21 44.6	1 21 32.5	1 21 20.4	1 21 8.3	0.97	1.21
34 30	1 22 18.7	1 22 6.6	1 21 54.4	1 21 42.3	1 21 30.2	1 21 18.0	0.98	1.21
34 40	1 22 28.6	1 22 16.5	1 22 4.3	1 21 52.2	1 21 40.0	1 21 27.8	0.99	1.22
34 50	1 22 38.6	1 22 26.5	1 22 14.3	1 22 2.1	1 21 49.9	1 21 37.7	1.00	1.22
35 0	1 22 48.7	1 22 36.5	1 22 24.3	1 22 12.1	1 21 59.9	1 21 47.7	+1.01	−1.22
35 10	1 22 58.9	1 22 46.6	1 22 34.4	1 22 22.2	1 22 9.9	1 21 57.7	1.01	1.22
35 20	1 23 9.1	1 22 56.9	1 22 44.6	1 22 32.3	1 22 20.1	1 22 7.8	1.02	1.23
35 30	1 23 19.5	1 23 7.2	1 22 54.9	1 22 42.6	1 22 30.3	1 22 18.0	1.03	1.23
35 40	1 23 29.9	1 23 17.6	1 23 5.3	1 22 52.9	1 22 40.6	1 22 28.3	1.04	1.23
35 50	1 23 40.4	1 23 28.0	1 23 15.7	1 23 3.4	1 22 51.0	1 22 38.7	+1.05	−1.23
36 0	1 23 51.0	1 23 38.6	1 23 26.2	1 23 13.9	1 23 1.5	1 22 49.2	1.06	1.24
36 10	1 24 1.6	1 23 49.3	1 23 36.9	1 23 24.5	1 23 12.1	1 22 59.7	1.07	1.24
36 20	1 24 12.4	1 24 0.0	1 23 47.6	1 23 35.2	1 23 22.8	1 23 10.3	1.07	1.24
36 30	1 24 23.3	1 24 10.8	1 23 58.4	1 23 45.9	1 23 33.5	1 23 21.1	1.08	1.24
36 40	1 24 34.2	1 24 21.7	1 24 9.3	1 23 56.8	1 23 44.3	1 23 31.9	+1.09	−1.25
36 50	1 24 45.2	1 24 32.7	1 24 20.2	1 24 7.8	1 23 55.3	1 23 42.8	1.10	1.25
37 0	1 24 56.4	1 24 43.9	1 24 31.3	1 24 18.8	1 24 6.3	1 23 53.8	1.11	1.25
37 10	1 25 7.6	1 24 55.1	1 24 42.5	1 24 29.9	1 24 17.4	1 24 4.8	1.12	1.26
37 20	1 25 18.9	1 25 6.3	1 24 53.8	1 24 41.2	1 24 28.6	1 24 16.0	1.13	1.26
37 30	1 25 30.3	1 25 17.7	1 25 5.1	1 24 52.5	1 24 39.9	1 24 27.3	+1.14	−1.26
37 40	1 25 41.8	1 25 29.2	1 25 16.5	1 25 3.9	1 24 51.3	1 24 38.6	1.15	1.26
37 50	1 25 53.4	1 25 40.8	1 25 28.1	1 25 15.4	1 25 2.8	1 24 50.1	1.16	1.27
38 0	1 26 5.1	1 25 52.4	1 25 39.7	1 25 27.0	1 25 14.3	1 25 1.6	1.17	1.27
38 10	1 26 16.9	1 26 4.2	1 25 51.5	1 25 38.7	1 25 26.0	1 25 13.3	1.18	1.27
38 20	1 26 28.8	1 26 16.0	1 26 3.3	1 25 50.5	1 25 37.8	1 25 25.0	+1.19	−1.28
38 30	1 26 40.8	1 26 28.0	1 26 15.2	1 26 2.4	1 25 49.7	1 25 36.9	1.20	1.28
38 40	1 26 52.9	1 26 40.0	1 26 27.2	1 26 14.4	1 26 1.6	1 25 48.8	1.21	1.28
38 50	1 27 5.0	1 26 52.2	1 26 39.4	1 26 26.5	1 26 13.7	1 26 0.9	1.22	1.28
39 0	1 27 17.3	1 27 4.5	1 26 51.6	1 26 38.7	1 26 25.9	1 26 13.0	1.23	1.29
39 10	1 27 29.7	1 27 16.8	1 27 3.9	1 26 51.0	1 26 38.1	1 26 25.2	+1.24	−1.29
39 20	1 27 42.2	1 27 29.3	1 27 16.4	1 27 3.4	1 26 50.5	1 26 37.6	1.25	1.29
39 30	1 27 54.8	1 27 41.9	1 27 28.9	1 27 15.9	1 27 3.0	1 26 50.0	1.26	1.30
39 40	1 28 7.5	1 27 54.5	1 27 41.5	1 27 28.5	1 27 15.5	1 27 2.6	1.27	1.30
39 50	1 28 20.3	1 28 7.3	1 27 54.3	1 27 41.3	1 27 28.2	1 27 15.2	1.28	1.30
40 0	1 28 33.2	1 28 20.2	1 28 7.1	1 27 54.1	1 27 41.0	1 27 28.0	+1.29	−1.31

AZIMUTH OF POLARIS AT ELONGATION, 1919.

Lat. \ Decl.	88° 52′ 10″	88° 52′ 20″	88° 52′ 30″	88° 52′ 40″	88° 52′ 50″	88° 53′ 0″	Variation for— 1′ of Lat.	Variation for— 1″ of δ.
° ′	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	″	″
40 0	1 28 33.2	1 28 20.2	1 28 7.1	1 27 54.1	1 27 41.0	1 27 28.0	+1.29	−1.31
40 10	1 28 46.3	1 28 33.2	1 28 20.1	1 28 7.0	1 27 53.9	1 27 40.8	1.30	1.31
40 20	1 28 59.4	1 28 46.3	1 28 33.2	1 28 20.0	1 28 6.9	1 27 53.8	1.31	1.31
40 30	1 29 12.7	1 28 59.5	1 28 46.4	1 28 33.2	1 28 20.0	1 28 6.9	1.32	1.32
40 40	1 29 26.0	1 29 12.8	1 28 59.6	1 28 46.5	1 28 33.3	1 28 20.1	1.33	1.32
40 50	1 29 39.5	1 29 26.3	1 29 13.0	1 28 59.8	1 28 46.6	1 28 33.4	+1.35	−1.32
41 0	1 29 53.1	1 29 39.8	1 29 26.6	1 29 13.3	1 29 0.1	1 28 46.8	1.36	1.33
41 10	1 30 6.8	1 29 53.5	1 29 40.2	1 29 26.9	1 29 13.6	1 29 0.3	1.37	1.33
41 20	1 30 20.6	1 30 7.3	1 29 53.9	1 29 40.6	1 29 27.3	1 29 14.0	1.38	1.33
41 30	1 30 34.5	1 30 21.2	1 30 7.8	1 29 54.4	1 29 41.1	1 29 27.7	1.39	1.34
41 40	1 30 48.6	1 30 35.2	1 30 21.8	1 30 8.4	1 29 55.0	1 29 41.6	+1.40	−1.34
41 50	1 31 2.7	1 30 49.3	1 30 35.9	1 30 22.5	1 30 9.0	1 29 55.6	1.41	1.34
42 0	1 31 17.0	1 31 3.6	1 30 50.1	1 30 36.6	1 30 23.2	1 30 9.7	1.42	1.35
42 10	1 31 31.4	1 31 17.9	1 31 4.4	1 30 50.9	1 30 37.4	1 30 24.0	1.44	1.35
42 20	1 31 46.0	1 31 32.4	1 31 18.9	1 31 5.4	1 30 51.8	1 30 38.3	1.45	1.35
42 30	1 32 0.6	1 31 47.0	1 31 33.5	1 31 19.9	1 31 6.3	1 30 52.8	+1.46	−1.36
42 40	1 32 15.4	1 32 1.8	1 31 48.2	1 31 34.6	1 31 21.0	1 31 7.4	1.48	1.36
42 50	1 32 30.3	1 32 16.7	1 32 3.0	1 31 49.4	1 31 35.7	1 31 22.1	1.49	1.36
43 0	1 32 45.3	1 32 31.7	1 32 18.0	1 32 4.3	1 31 50.6	1 31 37.0	1.50	1.37
43 10	1 33 0.5	1 32 46.8	1 32 33.1	1 32 19.4	1 32 5.6	1 31 51.9	1.51	1.37
43 20	1 33 15.8	1 33 2.0	1 32 48.3	1 32 34.5	1 32 20.8	1 32 7.0	+1.53	−1.38
43 30	1 33 31.2	1 33 17.4	1 33 3.6	1 32 49.9	1 32 36.1	1 32 22.3	1.54	1.38
43 40	1 33 46.8	1 33 33.0	1 33 19.1	1 33 5.3	1 32 51.5	1 32 37.7	1.55	1.38
43 50	1 34 2.5	1 33 48.6	1 33 34.7	1 33 20.9	1 33 7.0	1 32 53.2	1.57	1.39
44 0	1 34 18.3	1 34 4.4	1 33 50.5	1 33 36.6	1 33 22.7	1 33 8.8	1.58	1.39
44 10	1 34 34.3	1 34 20.3	1 34 6.4	1 33 52.4	1 33 38.5	1 33 24.6	+1.59	−1.39
44 20	1 34 50.4	1 34 36.4	1 34 22.4	1 34 8.4	1 33 54.4	1 33 40.5	1.61	1.40
44 30	1 35 6.6	1 34 52.6	1 34 38.6	1 34 24.6	1 34 10.5	1 33 56.5	1.62	1.40
44 40	1 35 23.0	1 35 9.0	1 34 54.9	1 34 40.8	1 34 26.8	1 34 12.7	1.63	1.41
44 50	1 35 39.5	1 35 25.4	1 35 11.3	1 34 57.2	1 34 43.1	1 34 29.0	1.65	1.41
45 0	1 35 56.2	1 35 42.1	1 35 27.9	1 35 13.8	1 34 59.6	1 34 45.5	+1.67	−1.41
45 10	1 36 13.0	1 35 58.9	1 35 44.7	1 35 30.5	1 35 16.3	1 35 2.1	1.68	1.42
45 20	1 36 30.0	1 36 15.8	1 36 1.6	1 35 47.3	1 35 33.1	1 35 18.9	1.69	1.42
45 30	1 36 47.1	1 36 32.9	1 36 18.6	1 36 4.3	1 35 50.1	1 35 35.8	1.71	1.43
45 40	1 37 4.4	1 36 50.1	1 36 35.8	1 36 21.5	1 36 7.2	1 35 52.8	1.72	1.43
45 50	1 37 21.8	1 37 7.5	1 36 53.1	1 36 38.8	1 36 24.4	1 36 10.0	+1.74	−1.44
46 0	1 37 39.4	1 37 25.0	1 37 10.6	1 36 56.2	1 36 41.8	1 36 27.4	1.76	1.44
46 10	1 37 57.1	1 37 42.7	1 37 28.3	1 37 13.8	1 36 59.4	1 36 44.9	1.77	1.44
46 20	1 38 15.0	1 38 0.5	1 37 46.1	1 37 31.6	1 37 17.1	1 37 2.6	1.79	1.45
46 30	1 38 33.1	1 38 18.5	1 38 4.0	1 37 49.5	1 37 35.0	1 37 20.4	1.80	1.45
46 40	1 38 51.3	1 38 36.7	1 38 22.1	1 38 7.6	1 37 53.0	1 37 38.4	+1.82	−1.46
46 50	1 39 9.7	1 38 55.0	1 38 40.4	1 38 25.8	1 38 11.2	1 37 56.6	1.84	1.46
47 0	1 39 28.2	1 39 13.5	1 38 58.9	1 38 44.2	1 38 29.5	1 38 14.9	1.85	1.47
47 10	1 39 46.9	1 39 32.2	1 39 17.5	1 39 2.8	1 38 48.0	1 38 33.3	1.87	1.47
47 20	1 40 5.8	1 39 51.0	1 39 36.3	1 39 21.5	1 39 6.7	1 38 52.0	1.88	1.48
47 30	1 40 24.8	1 40 10.0	1 39 55.2	1 39 40.4	1 39 25.6	1 39 10.8	+1.90	−1.48
47 40	1 40 44.0	1 40 29.2	1 40 14.3	1 39 59.5	1 39 44.6	1 39 29.8	1.92	1.48
47 50	1 41 3.4	1 40 48.5	1 40 33.6	1 40 18.7	1 40 3.8	1 39 48.9	1.94	1.49
48 0	1 41 23.0	1 41 8.1	1 40 53.1	1 40 38.2	1 40 23.2	1 40 8.3	1.96	1.49
48 10	1 41 42.8	1 41 27.8	1 41 12.8	1 40 57.8	1 40 42.8	1 40 27.8	1.97	1.50
48 20	1 42 2.7	1 41 47.6	1 41 32.6	1 41 17.5	1 41 2.5	1 40 47.4	+1.99	−1.51
48 30	1 42 22.8	1 42 7.7	1 41 52.6	1 41 37.5	1 41 22.4	1 41 7.3	2.01	1.51
48 40	1 42 43.1	1 42 27.9	1 42 12.8	1 41 57.7	1 41 42.5	1 41 27.4	2.03	1.51
48 50	1 43 3.6	1 42 48.4	1 42 33.2	1 42 18.0	1 42 2.8	1 41 47.6	2.05	1.52
49 0	1 43 24.2	1 43 9.0	1 42 53.8	1 42 38.5	1 42 23.3	1 42 8.0	2.06	1.52
49 10	1 43 45 1	1 43 29.8	1 43 14.5	1 42 59.2	1 42 43.9	1 42 28.6	+2.08	−1.53
49 20	1 44 6 2	1 43 50.8	1 43 35.5	1 43 20.1	1 43 4.8	1 42 49.4	2.10	1.54
49 30	1 44 27.4	1 44 12.0	1 43 56.6	1 43 41.2	1 43 25.8	1 43 10.4	2.12	1.54
49 40	1 44 48.9	1 44 33.4	1 44 18.0	1 44 2.5	1 43 47.1	1 43 31.6	2.14	1.55
49 50	1 45 10.5	1 44 55.0	1 44 39.5	1 44 24.0	1 44 8.5	1 43 53.0	2.16	1.55
50 0	1 45 32.4	1 45 16.8	1 45 1.3	1 44 45.7	1 44 30.1	1 44 14.8	+2.18	−1.56

AZIMUTH OF POLARIS AT ELONGATION, 1919.

Lat. \ Decl.	88° 52′ 10″	88° 52′ 20″	88° 52′ 30″	88° 52′ 40″	88° 52′ 50″	88° 53′ 0″	Variation for— 1′ of Lat.	Variation for— 1″ of δ.
° ′	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	″	″
50 0	1 45 32.4	1 45 16.8	1 45 1.3	1 44 45.7	1 44 30.1	1 44 14.6	+2.18	−1.56
50 10	1 45 54.4	1 45 38.8	1 45 23.2	1 45 7.6	1 44 52.0	1 44 36.4	2.20	1.56
50 20	1 46 16.7	1 46 1.1	1 45 45.4	1 45 29.7	1 45 14.0	1 44 58.4	2.22	1.57
50 30	1 46 39.2	1 46 23.5	1 46 7.7	1 45 52.0	1 45 36.3	1 45 20.6	2.24	1.57
50 40	1 47 1.9	1 46 46.1	1 46 30.3	1 46 14.5	1 45 58.8	1 45 43.0	2.27	1.58
50 50	1 47 24.8	1 47 9.0	1 46 53.1	1 46 37.3	1 46 21.5	1 46 5.6	+2.29	−1.58
51 0	1 47 47.9	1 47 32.0	1 47 16.1	1 47 0.2	1 46 44.4	1 46 28.5	2.31	1.59
51 10	1 48 11.3	1 47 55.3	1 47 39.4	1 47 23.4	1 47 7.5	1 46 51.5	2.34	1.60
51 20	1 48 34.9	1 48 18.9	1 48 2.9	1 47 46.8	1 47 30.8	1 47 14.8	2.36	1.60
51 30	1 48 58.7	1 48 42.6	1 48 26.5	1 48 10.5	1 47 54.4	1 47 38.3	2.38	1.61
51 40	1 49 22.7	1 49 6.6	1 48 50.4	1 48 34.3	1 48 18.2	1 48 2.1	+2.40	−1.61
51 50	1 49 47.0	1 49 30.8	1 49 14.6	1 48 58.4	1 48 42.2	1 48 26.0	2.43	1.62
52 0	1 50 11.5	1 49 55.2	1 49 39.0	1 49 22.7	1 49 6.5	1 48 50.2	2.45	1.63
52 10	1 50 36.2	1 50 19.9	1 50 3.6	1 49 47.3	1 49 31.0	1 49 14.7	2.47	1.63
52 20	1 51 1.2	1 50 44.8	1 50 28.5	1 50 12.1	1 49 55.7	1 49 39.4	2.50	1.64
52 30	1 51 26.4	1 51 10.0	1 50 53.6	1 50 37.1	1 50 20.7	1 50 4.3	+2.52	−1.64
52 40	1 51 51.9	1 51 35.4	1 51 18.9	1 51 2.4	1 50 45.9	1 50 29.5	2.55	1.65
52 50	1 52 17.7	1 52 1.1	1 51 44.5	1 51 28.0	1 51 11.4	1 50 54.9	2.57	1.66
53 0	1 52 43.6	1 52 27.0	1 52 10.4	1 51 53.8	1 51 37.2	1 51 20.5	2.60	1.66
53 10	1 53 9.9	1 52 53.2	1 52 36.5	1 52 19.8	1 52 3.2	1 51 46.5	2.62	1.67
53 20	1 53 36.4	1 53 19.7	1 53 2.9	1 52 46.1	1 52 29.4	1 52 12.7	+2.65	−1.67
53 30	1 54 3.2	1 53 46.4	1 53 29.6	1 53 12.7	1 52 55.9	1 52 39.1	2.68	1.68
53 40	1 54 30.2	1 54 13.4	1 53 56.5	1 53 39.6	1 53 22.7	1 53 5.8	2.70	1.69
53 50	1 54 57.6	1 54 40.6	1 54 23.7	1 54 6.7	1 53 49.8	1 53 32.8	2.73	1.70
54 0	1 55 25.1	1 55 8.1	1 54 51.1	1 54 34.1	1 54 17.1	1 54 0.1	2.76	1.70
54 10	1 55 53.0	1 55 35.9	1 55 18.8	1 55 1.8	1 54 44.7	1 54 27.6	+2.78	−1.71
54 20	1 56 21.2	1 56 4.0	1 55 46.9	1 55 29.7	1 55 12.6	1 54 55.4	2.81	1.72
54 30	1 56 49.6	1 56 32.4	1 56 15.2	1 55 58.0	1 55 40.7	1 55 23.5	2.84	1.72
54 40	1 57 18.4	1 57 1.1	1 56 43.8	1 56 26.5	1 56 9.2	1 55 51.9	2.87	1.73
54 50	1 57 47.4	1 57 30.1	1 57 12.7	1 56 55.3	1 56 38.0	1 56 20.6	2.90	1.74
55 0	1 58 16.8	1 57 59.3	1 57 41.9	1 57 24.4	1 57 7.0	1 56 49.6	+2.93	−1.74
55 10	1 58 46.4	1 58 28.9	1 58 11.4	1 57 53.9	1 57 36.3	1 57 18.8	2.96	1.75
55 20	1 59 16.4	1 58 58.8	1 58 41.2	1 58 23.6	1 58 6.0	1 57 48.4	2.99	1.76
55 30	1 59 46.6	1 59 29.0	1 59 11.4	1 58 53.7	1 58 36.0	1 58 18.3	3.02	1.77
55 40	2 0 17.2	1 59 59.5	1 59 41.8	1 59 24.0	1 59 6.3	1 58 48.5	3.05	1.77
55 50	2 0 48.1	2 0 30.3	2 0 12.5	1 59 54.7	1 59 36.9	1 59 19.1	+3.09	−1.78
56 0	2 1 19.4	2 1 1.5	2 0 43.6	2 0 25.7	2 0 7.8	1 59 49.9	3.12	1.79
56 10	2 1 51.0	2 1 33.0	2 1 15.0	2 0 57.0	2 0 39.1	2 0 21.1	3.16	1.80
56 20	2 2 22.9	2 2 4.8	2 1 46.8	2 1 28.7	2 1 10.7	2 0 52.6	3.19	1.81
56 30	2 2 55.1	2 2 37.0	2 2 18.9	2 2 0.7	2 1 42.6	2 1 24.5	3.22	1.81
56 40	2 3 27.7	2 3 9.5	2 2 51.3	2 2 33.1	2 2 14.9	2 1 56.7	+3.26	−1.82
56 50	2 4 0.7	2 3 42.4	2 3 24.1	2 3 5.8	2 2 47.5	2 2 29.2	3.29	1.83
57 0	2 4 34.0	2 4 15.6	2 3 57.2	2 3 38.9	2 3 20.5	2 3 2.1	3.33	1.84
57 10	2 5 7.7	2 4 49.2	2 4 30.8	2 4 12.3	2 3 53.9	2 3 35.4	3.36	1.85
57 20	2 5 41.7	2 5 23.2	2 5 4.6	2 4 46.1	2 4 27.6	2 4 9.0	3.40	1.85
57 30	2 6 16.1	2 5 57.5	2 5 38.9	2 5 20.3	2 5 1.6	2 4 43.0	+3.44	−1.86
57 40	2 6 50.9	2 6 32.2	2 6 13.5	2 5 54.8	2 5 36.1	2 5 17.4	3.48	1.87
57 50	2 7 26.1	2 7 7.3	2 6 48.5	2 6 29.7	2 6 11.0	2 5 52.2	3.52	1.88
58 0	2 8 1.7	2 7 42.8	2 7 23.9	2 7 5.1	2 6 46.2	2 6 27.3	3.56	1.89
58 10	2 8 37.7	2 8 18.7	2 7 59.7	2 7 40.8	2 7 21.8	2 7 2.8	3.60	1.90
58 20	2 9 14.0	2 8 55.0	2 8 35.9	2 8 16.9	2 7 57.8	2 7 38.8	+3.64	−1.90
58 30	2 9 50.8	2 9 31.7	2 9 12.6	2 8 53.4	2 8 34.2	2 8 15.1	3.68	1.91
58 40	2 10 28.1	2 10 8.8	2 9 49.6	2 9 30.3	2 9 11.1	2 8 51.9	3.72	1.92
58 50	2 11 5.7	2 10 46.4	2 10 27.0	2 10 7.7	2 9 48.4	2 9 29.0	3.76	1.93
59 0	2 11 43.8	2 11 24.3	2 11 4.9	2 10 45.5	2 10 26.0	2 10 6.6	3.80	1.94
59 10	2 12 22.3	2 12 2.7	2 11 43.2	2 11 23.7	2 11 4.2	2 10 44.6	+3.85	−1.95
59 20	2 13 1.2	2 12 41.6	2 12 22.0	2 12 2.4	2 11 42.7	2 11 23.1	3.89	1.96
59 30	2 13 40.6	2 13 20.9	2 13 1.2	2 12 41.5	2 12 21.7	2 12 2.0	3.94	1.97
59 40	2 14 20.5	2 14 0.6	2 13 40.8	2 13 21.0	2 13 1.2	2 12 41.4	3.99	1.98
59 50	2 15 0.8	2 14 40.9	2 14 21.0	2 14 1.1	2 13 41.1	2 13 21.2	4.04	1.99
60 0	2 15 41.6	2 15 21.6	2 15 1.6	2 14 41.6	2 14 21.5	2 14 1.5	+4.08	−2.00

AZIMUTH OF POLARIS AT ELONGATION, 1919.

Decl. / Lat.	88° 52′ 10″	88° 52′ 20″	88° 52′ 30″	88° 52′ 40″	88° 52′ 50″	88° 53′ 0″	Variation for— 1′ of Lat.	1″ of δ.
° ′	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	″	″
60 0	2 15 41.6	2 15 21.6	2 15 1.6	2 14 41.6	2 14 21.5	2 14 1.5	+4.08	−2.00
60 10	2 16 22.9	2 16 2.8	2 15 42.6	2 15 22.5	2 15 2.4	2 14 42.3	4.13	2.01
60 20	2 17 4.6	2 16 44.4	2 16 24.2	2 16 4.0	2 15 43.8	2 15 23.6	4.18	2.02
60 30	2 17 46.9	2 17 26.6	2 17 6.3	2 16 46.0	2 16 25.6	2 16 5.3	4.23	2.03
60 40	2 18 29.7	2 18 9.3	2 17 48.8	2 17 28.4	2 17 8.0	2 16 47.6	4.28	2.04
60 50	2 19 13.0	2 18 52.5	2 18 31.9	2 18 11.4	2 17 50.9	2 17 30.3	+4.33	−2.05
61 0	2 19 56.8	2 19 36.2	2 19 15.5	2 18 54.9	2 18 34.3	2 18 13.6	4.38	2.06
61 10	2 20 41.2	2 20 20.4	2 19 59.7	2 19 38.9	2 19 18.2	2 18 57.4	4.44	2.08
61 20	2 21 26.1	2 21 5.2	2 20 44.4	2 20 23.5	2 20 2.6	2 19 41.8	4.49	2.09
61 30	2 22 11.5	2 21 50.6	2 21 29.6	2 21 8.6	2 20 47.6	2 20 26.7	4.54	2.10
61 40	2 22 57.5	2 22 36.5	2 22 15.4	2 21 54.3	2 21 33.2	2 21 12.1	+4.60	−2.11
61 50	2 23 44.1	2 23 23.0	2 23 1.8	2 22 40.6	2 22 19.4	2 21 58.1	4.66	2.12
62 0	2 24 31.3	2 24 10.0	2 23 48.7	2 23 27.4	2 23 6.1	2 22 44.7	4.72	2.13
62 10	2 25 19.1	2 24 57.6	2 24 36.2	2 24 14.8	2 23 53.3	2 23 31.9	4.78	2.14
62 20	2 26 7.4	2 25 45.9	2 25 24.3	2 25 2.8	2 24 41.2	2 24 19.7	4.84	2.15
62 30	2 26 56.4	2 26 34.8	2 26 13.1	2 25 51.4	2 25 29.7	2 25 8.1	+4.90	−2.17
62 40	2 27 46.0	2 27 24.3	2 27 2.5	2 26 40.7	2 26 18.9	2 25 57.1	4.96	2.18
62 50	2 28 36.3	2 28 14.4	2 27 52.5	2 27 30.5	2 27 8.6	2 26 46.7	5.02	2.19
63 0	2 29 27.2	2 29 5.1	2 28 43.1	2 28 21.1	2 27 59.0	2 27 37.0	5.09	2.20
63 10	2 30 18.8	2 29 56.6	2 29 34.4	2 29 12.2	2 28 50.1	2 28 27.9	5.16	2.22
63 20	2 31 11.0	2 30 48.7	2 30 26.4	2 30 4.1	2 29 41.8	2 29 19.5	+5.22	−2.23
63 30	2 32 3.9	2 31 41.5	2 31 19.0	2 30 56.6	2 30 34.2	2 30 11.8	5.29	2.24
63 40	2 32 57.5	2 32 35.0	2 32 12.4	2 31 49.8	2 31 27.3	2 31 4.7	5.37	2.26
63 50	2 33 51.8	2 33 29.2	2 33 6.5	2 32 43.8	2 32 21.1	2 31 58.4	5.44	2.27
64 0	2 34 46.9	2 34 24.1	2 34 1.2	2 33 38.4	2 33 15.6	2 32 52.8	5.51	2.28
64 10	2 35 42.7	2 35 19.7	2 34 56.8	2 34 33.8	2 34 10.8	2 33 47.9	+5.58	−2.30
64 20	2 36 39.3	2 36 16.1	2 35 53.0	2 35 29.9	2 35 6.8	2 34 43.7	5.66	2.31
64 30	2 37 36.6	2 37 13.3	2 36 50.1	2 36 26.8	2 36 3.6	2 35 40.3	5.74	2.33
64 40	2 38 34.7	2 38 11.3	2 37 47.9	2 37 24.5	2 37 1.1	2 36 37.7	5.82	2.34
64 50	2 39 33.6	2 39 10.1	2 38 46.5	2 38 23.0	2 37 59.4	2 37 35.9	5.90	2.35
65 0	2 40 33.3	2 40 9.6	2 39 45.9	2 39 22.3	2 38 58.6	2 38 34.9	+5.98	−2.37
65 10	2 41 33.9	2 41 10.0	2 40 46.2	2 40 22.4	2 39 58.5	2 39 34.7	6.06	2.38
65 20	2 42 35.3	2 42 11.3	2 41 47.3	2 41 23.3	2 40 59.3	2 40 35.4	6.14	2.40
65 30	2 43 37.6	2 43 13.4	2 42 49.3	2 42 25.1	2 42 1.0	2 41 36.9	6.23	2.41
65 40	2 44 40.7	2 44 16.4	2 43 52.1	2 43 27.8	2 43 3.5	2 42 39.2	6.32	2.43
65 50	2 45 44.8	2 45 20.3	2 44 55.9	2 44 31.4	2 44 7.0	2 43 42.5	+6.41	−2.45
66 0	2 46 49.8	2 46 25.1	2 46 0.5	2 45 35.9	2 45 11.3	2 44 46.7	6.51	2.46
66 10	2 47 55.7	2 47 30.9	2 47 6.1	2 46 41.3	2 46 16.6	2 45 51.8	6.61	2.48
66 20	2 49 2.6	2 48 37.6	2 48 12.7	2 47 47.7	2 47 22.8	2 46 57.9	6.70	2.49
66 30	2 50 10.4	2 49 45.3	2 49 20.2	2 48 55.1	2 48 30.0	2 48 4.9	6.80	2.51
66 40	2 51 19.3	2 50 54.0	2 50 28.7	2 50 3.5	2 49 38.2	2 49 12.9	+6.90	−2.53
66 50	2 52 29.2	2 52 3.7	2 51 38.3	2 51 12.8	2 50 47.4	2 50 22.0	7.00	2.54
67 0	2 53 40.1	2 53 14.5	2 52 48.9	2 52 23.3	2 51 57.6	2 51 32.0	7.11	2.56
67 10	2 54 52.1	2 54 26.3	2 54 0.5	2 53 34.7	2 53 8.9	2 52 43.1	7.21	2.58
67 20	2 56 5.2	2 55 39.3	2 55 13.3	2 54 47.3	2 54 21.3	2 53 55.3	7.32	2.60
67 30	2 57 19.4	2 56 53.3	2 56 27.1	2 56 1.0	2 55 34.8	2 55 8.6	+7.43	−2.62
67 40	2 58 34.8	2 58 8.5	2 57 42.1	2 57 15.8	2 56 49.4	2 56 23.1	7.55	2.63
67 50	2 59 51.3	2 59 24.8	2 58 58.3	2 58 31.7	2 58 5.2	2 57 38.7	7.67	2.65
68 0	3 1 9.0	3 0 42.3	3 0 15.6	2 59 48.9	2 59 22.1	2 58 55.4	7.79	2.67
68 10	3 2 28.0	3 2 1.1	3 1 34.2	3 1 7.2	3 0 40.3	3 0 13.4	7.91	2.69
68 20	3 3 48.2	3 3 21.1	3 2 54.0	3 2 26.8	3 1 59.7	3 1 32.6	+8.03	−2.71
68 30	3 5 9.7	3 4 42.3	3 4 15.0	3 3 47.7	3 3 20.4	3 2 53.1	8.16	2.73
68 40	3 6 32.4	3 6 4.9	3 5 37.4	3 5 9.9	3 4 42.3	3 4 14.8	8.29	2.75
68 50	3 7 56.6	3 7 28.8	3 7 1.1	3 6 33.4	3 6 5.6	3 5 37.9	8.43	2.77
69 0	3 9 22.1	3 8 54.1	3 8 26.2	3 7 58.2	3 7 30.3	3 7 2.3	8.57	2.80
69 10	3 10 49.0	3 10 20.8	3 9 52.6	3 9 24.5	3 8 56.3	3 8 28.2	+8.71	−2.82
69 20	3 12 17.3	3 11 48.9	3 11 20.5	3 10 52.2	3 10 23.8	3 9 55.4	8.85	2.84
69 30	3 13 47.1	3 13 18.5	3 12 49.9	3 12 21.3	3 11 52.7	3 11 24.1	9.00	2.86
69 40	3 15 18.4	3 14 49.6	3 14 20.8	3 13 51.9	3 13 23.1	3 12 54.3	9.15	2.88
69 50	3 16 51.3	3 16 22.2	3 15 53.2	3 15 24.1	3 14 55.1	3 14 26.0	9.31	2.91
70 0	3 18 25.7	3 17 56.4	3 17 27.2	3 16 57.9	3 16 28.6	3 15 59.3	+9.47	−2.93

FOR REDUCING TO ELONGATION OBSERVATIONS MADE NEAR ELONGATION.

Time.* \ Azimuth at Elong.	1° 0′	1° 10′	1° 20′	1° 30′	1° 40′	1° 50′	2° 0′	2° 10′	Time.*
m	″	″	″	″	″	″	″	″	m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1	0.0	0.0	0.0	+ 0.1	+ 0.1	+ 0.1	+0.1	+ 0.1	1
2	+ 0.1	+ 0.2	+ 0.2	0.2	0.2	0.3	0.3	0.3	2
3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	3
4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	4
5	+ 0.9	+ 1.0	+ 1.1	+ 1.3	+ 1.4	+ 1.6	+ 1.7	+ 1.9	5
6	1.2	1.4	1.6	1.8	2.1	2.3	2.5	2.7	6
7	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7	7
8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	8
9	2.8	3.2	3.7	4.2	4.6	5.1	5.6	6.0	9
10	+ 3.4	+ 4.0	+ 4.6	+ 5.1	+ 5.7	+ 6.3	+ 6.9	+ 7.4	10
11	4.1	4.8	5.5	6.2	6.9	7.6	8.3	9.0	11
12	4.9	5.8	6.6	7.4	8.2	9.0	9.9	10.7	12
13	5.8	6.8	7.7	8.7	9.7	10.6	11.6	12.6	13
14	6.7	7.8	9.0	10.1	11.2	12.3	13.4	14.6	14
15	+ 7.7	+ 9.0	+10.3	+11.6	+12.8	+14.1	+15.4	+16.7	15
16	8.8	10.2	11.7	13.2	14.6	16.1	17.5	19.0	16
17	9.9	11.5	13.2	14.9	16.5	18.2	19.8	21.5	17
18	11.1	12.9	14.8	16.7	18.5	20.4	22.2	24.1	18
19	12.4	14.4	16.5	18.6	20.6	22.7	24.7	26.8	19
20	+13.7	+16.0	+18.3	+20.6	+22.8	+25.1	+27.4	+29.7	20
21	15.1	17.6	20.1	22.7	25.2	27.7	30.2	32.7	21
22	16.6	19.3	22.1	24.9	27.6	30.4	33.2	35.9	22
23	18.1	21.1	24.2	27.2	30.2	33.2	36.2	39.3	23
24	19.7	23.0	26.3	29.6	32.9	36.2	39.5	42.8	24
25	+21.4	+25.0	+28.5	+32.1	+35.7	+39.2	+42.8	+46.4	25

Time.* \ Azimuth at Elong.	2° 10′	2° 20′	2° 30′	2° 40′	2° 50′	3° 0′	3° 10′	3° 20′	Time.*
m	″	″	″	″	″	″	″	″	m
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	+ 0.1	1
2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	2
3	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	3
4	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.8	4
5	+ 1.9	+ 2.0	+ 2.1	+ 2.3	+ 2.4	+ 2.6	+ 2.7	+ 2.9	5
6	2.7	2.9	3.1	3.3	3.5	3.7	3.9	4.1	6
7	3.7	3.9	4.2	4.5	4.8	5.0	5.3	5.6	7
8	4.8	5.1	5.5	5.9	6.2	6.6	7.0	7.3	8
9	6.0	6.5	7.0	7.4	7.9	8.3	8.8	9.3	9
10	+ 7.4	+ 8.0	+ 8.6	+ 9.2	+ 9.7	+10.3	+10.9	+11.4	10
11	9.0	9.7	10.4	11.1	11.8	12.4	13.1	13.8	11
12	10.7	11.5	12.3	13.2	14.0	14.8	15.6	16.5	12
13	12.6	13.5	14.5	15.4	16.4	17.4	18.4	19.3	13
14	14.6	15.7	16.8	17.9	19.0	20.2	21.3	22.4	14
15	+16.7	+18.0	+19.3	+20.6	+21.9	+23.1	+24.4	+25.7	15
16	19.0	20.5	21.9	23.4	24.9	26.3	27.8	29.3	16
17	21.5	23.1	24.8	26.4	28.1	29.7	31.4	33.0	17
18	24.1	25.9	27.8	29.6	31.5	33.3	35.2	37.0	18
19	26.8	28.9	30.9	33.0	35.1	37.1	39.2	41.3	19
20	+29.7	+32.0	+34.3	+36.6	+38.8	+41.1	+43.4	+45.7	20
21	32.7	35.3	37.8	40.3	42.8	45.3	47.9	50.4	21
22	35.9	38.7	41.5	44.2	47.0	49.8	52.5	55.3	22
23	39.3	42.3	45.3	48.3	51.4	54.4	57.4	60.4	23
24	42.8	46.0	49.3	52.6	55.9	59.2	62.5	65.8	24
25	+46.4	+49.9	+53.5	+57.1	+60.7	+64.2	+67.8	+71.4	25

* Sidereal time from elongation.

TABLE VI.

FOR FINDING THE TIMES OF UPPER AND LOWER CULMINATION OF POLARIS, 1919, FROM THE OBSERVED TIMES WHEN THE STAR IS ON THE SAME VERTICAL CIRCLE WITH THE STARS ζ URSÆ MAJORIS (MIZAR) *SUB POLO* AND δ CASSIOPEIÆ *SUB POLO*, RESPECTIVELY.

Except at high latitudes, the pole star at either upper or lower culmination furnishes a simple and convenient method for laying down a meridian line on the earth's surface at points in the northern hemisphere. When the local time is unknown and accurate astronomical instruments are not available, the time of culmination of Polaris may be found by observing the instant when Polaris is vertically above (has the same azimuth as) ζ Ursæ Majoris (Mizar) below the pole, or δ Cassiopeiæ below the pole. In the former case, for the year 1919, Polaris is approaching upper culmination and in the latter case it is approaching lower culmination. The mean time interval which elapses between either of the observed times above mentioned and upper or lower culmination, as the case may be, is given at ten-day intervals in the following table. This method can not be used at places south of 30° north latitude.

ζ URSÆ MAJORIS (MIZAR). (Upper culmination of Polaris.)						
Date.		Lat. 40°	45°	50°	55°	60°
		m s	m s	m s	m s	m s
Jan.	1	10 37	10 35	10 33	10 30	10 26
	11	10 27	10 25	10 23	10 20	10 16
	21	10 16	10 14	10 12	10 9	10 5
	31	10 6	10 4	10 1	9 58	9 55
Feb.	10	9 55	9 53	9 51	9 48	9 45
	20	9 46	9 44	9 42	9 39	9 36
Mar.	2	9 38	9 36	9 34	9 31	9 28
June	30	10 20	10 18	10 16	10 13	10 9
July	10	10 31	10 29	10 27	10 24	10 20
	20	10 42	10 40	10 38	10 35	10 31
	30	10 53	10 51	10 49	10 46	10 42
Aug.	9	11 4	11 2	10 59	10 56	10 52
	19	11 14	11 12	11 9	11 6	11 2
	29	11 23	11 21	11 18	11 15	11 11
Sept.	8	11 31	11 28	11 26	11 22	11 18
	18	11 37	11 35	11 32	11 29	11 25
	28	11 43	11 40	11 38	11 34	11 30
Oct.	8	11 46	11 44	11 41	11 38	11 34
	18	11 49	11 46	11 44	11 40	11 36
	28	11 49	11 47	11 44	11 41	11 36
Nov.	7	11 48	11 45	11 43	11 39	11 35
	17	11 45	11 42	11 40	11 36	11 32
	27	11 40	11 37	11 35	11 32	11 27
Dec.	7	11 33	11 31	11 28	11 25	11 21
	17	11 25	11 23	11 21	11 17	11 13
	27	11 16	11 14	11 11	11 8	11 4
	31	11 12	11 10	11 8	11 4	11 0

δ CASSIOPEIÆ. (Lower culmination of Polaris.)						
Date.		Lat. 35°	40°	45°	50°	55°
		m s	m s	m s	m s	m s
Jan.	1	11 46	11 48	11 51	11 53	11 56
	11	11 36	11 38	11 40	11 42	11 46
	21	11 25	11 27	11 29	11 31	11 35
	31	11 14	11 16	11 18	11 21	11 24
Feb.	10	11 4	11 6	11 8	11 10	11 13
	20	10 54	10 56	10 58	11 1	11 4
Mar.	2	10 46	10 48	10 50	10 52	10 55
	12	10 40	10 41	10 43	10 46	10 49
	22	10 35	10 37	10 39	10 41	10 44
Apr.	1	10 32	10 34	10 36	10 38	10 41
	11	10 32	10 34	10 36	10 38	10 41
	21	10 33	10 35	10 37	10 40	10 42
May	1	10 37	10 39	10 41	10 43	10 46
	11	10 42	10 44	10 46	10 49	10 52
	21	10 50	10 51	10 53	10 56	10 59
	31	10 58	11 0	11 2	11 4	11 7
June	10	11 8	11 9	11 11	11 14	11 17
	20	11 18	11 20	11 22	11 25	11 28
	30	11 29	11 31	11 33	11 36	11 39
July	10	11 41	11 42	11 45	11 47	11 50
	20	11 52	11 54	11 56	11 59	12 2
July	30	12 3	12 5	12 7	12 10	12 13
Nov.	27	12 51	12 53	12 55	12 58	13 1
Dec.	7	12 44	12 46	12 48	12 51	12 55
	17	12 36	12 38	12 40	12 43	12 46
	27	12 26	12 28	12 31	12 33	12 37
	31	12 22	12 24	12 27	12 29	12 33

APPARENT PLACE, TIME OF UPPER CULMINATION, AND TIME INTERVAL BETWEEN UPPER CULMINATION AND ELONGATION EAST OR WEST, OF POLARIS, 1919.

The local mean time of culmination on any meridian for a given date is found by taking from the following table the *Mean Time* of the nearest Greenwich culmination, and applying to it the product of the *Var. per Day* by the integral number of intervening days, this product being numerically additive for an earlier date and subtractive for a later date than that given in the table; and by applying also the product of the *Var. per Hour* by the longitude from Greenwich expressed in hours and fractions of an hour, this product being numerically additive for East longitudes and subtractive for West longitudes.

The time interval between upper and lower culmination is 12^h diminished by one-half the numerical value of the *Var. per Day*.

The last column below applies to all meridians.

Date.	Upper Culmination, Meridian of Greenwich.					Latitude.	Mean Time Interval, Elongation *minus* Upper Culm.
	Apparent Right Ascension.	Apparent Declination.	Mean Time.	Var. per Day.	Var. per Hour.		
	h m 1 30	° ′ +88 52			W. E.		W. E.
	s	″	h m s	m s	s	°	h m
Jan. 1	108	45.3	6 50 20	−3 56.9	−9.87+	10	+5 58.2−
11	98	46.3	6 10 50	3 57.0	9.87	12	5 58.1
21	87	46.6	5 31 20	3 57.0	9.87	14	5 57.9
31	76	46.3	4 51 51	3 57.0	9.87	16	5 57.7
Feb. 10	66	45.3	4 12 21	3 56.9	9.87	18	5 57.6
20	57	43.7	3 32 53	−3 56.8	−9.87+	20	+5 57.4−
Mar. 2	49	41.6	2 53 26	3 56.6	9.86	22	5 57.2
12	42	39.1	2 14 0	3 56.5	9.85	24	5 57.0
22	38	36.2	1 34 37	3 56.3	9.84	26	5 56.8
Apr. 1	35	33.1	0 55 15	3 56.1	9.84	28	5 56.6
11	34	30.0	0 15 55	−3 55.9	−9.83+	30	+5 56.4−
20	36	26.9	23 36 38	3 55.7	9.82	32	5 56.2
30	39	23.9	22 57 22	3 55.5	9.81	34	5 56.0
May 10	45	21.2	22 18 8	3 55.3	9.80	36	5 55.8
20	52	18.8	21 38 56	3 55.1	9.80	38	5 55.5
30	60	16.8	20 59 45	−3 55.0	−9.79+	40	+5 55.3−
June 9	70	15.3	20 20 36	3 54.9	9.79	42	5 55.0
19	80	14.4	19 41 27	3 54.8	9.78	44	5 54.7
29	91	13.9	19 2 19	3 54.8	9.78	46	5 54.4
July 9	103	14.1	18 23 11	3 54.8	9.78	48	5 54.0
19	114	14.7	17 44 4	−3 54.8	−9.78+	50	+5 53.7−
29	125	15.9	17 4 56	3 54.8	9.78	52	5 53.3
Aug. 8	136	17.6	16 25 48	3 54.9	9.79	54	5 52.9
18	146	19.7	15 46 39	3 54.9	9.79	56	5 52.4
28	156	22.2	15 7 29	3 55.0	9.79	58	5 51.8
Sept. 7	164	25.1	14 28 18	−3 55.2	−9.80+	60	+5 51.3−
17	171	28.4	13 49 6	3 55.3	9.80	62	5 50.6
27	176	31.8	13 9 52	3 55.4	9.81	64	5 49.8
Oct. 7	180	35.5	12 30 37	3 55.6	9.82	66	5 49.0
17	183	39.2	11 51 20	3 55.8	9.82	68	5 47.9
27	183	43.0	11 12 2	−3 55.9	−9.83+	70	+5 46.7−
Nov. 6	182	46.7	10 32 42	3 56.1	9.84		
16	179	50.2	9 53 20	3 56.3	9.85		
26	175	53.4	9 13 56	3 56.5	9.85		
Dec. 6	168	56.3	8 34 31	3 56.6	9.86		
16	161	58.8	7 55 4	−3 56.8	−9.86+		
26	152	60.8	7 15 36	−3 56.9	−9.87+		

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan. 0	17 59	18 17	18 35	18 56	19 8	19 22	19 38	19 59	20 8	20 19	20 32	20 46	21 3
1	18 0	18 17	18 35	18 56	19 8	19 22	19 39	19 59	20 8	20 19	20 32	20 46	21 3
2	18 0	18 18	18 36	18 56	19 8	18 22	19 39	19 59	20 8	20 19	20 31	20 46	21 2
3	18 1	18 18	18 36	18 57	19 9	19 22	19 39	19 59	20 8	20 19	20 31	20 45	21 2
4	18 1	18 18	18 36	18 57	19 9	19 22	19 38	19 58	20 8	20 18	20 30	20 44	21 1
5	18 2	18 19	18 36	18 57	19 9	19 22	19 38	19 58	20 8	20 18	20 30	20 44	21 0
6	18 2	18 19	18 37	18 57	19 9	19 22	19 38	19 58	20 7	20 18	20 30	20 43	20 59
7	18 3	18 19	18 37	18 57	19 9	19 22	19 38	19 58	20 7	20 17	20 29	20 42	20 58
8	18 3	18 20	18 37	18 57	19 9	19 22	19 38	19 57	20 6	20 16	20 28	20 42	20 57
9	18 4	18 20	18 37	18 57	19 9	19 22	19 38	19 57	20 6	20 16	20 28	20 41	20 56
10	18 4	18 20	18 38	18 57	19 9	19 22	19 37	19 56	20 5	20 15	20 27	20 40	20 55
11	18 4	18 20	18 38	18 57	19 9	19 22	19 37	19 56	20 5	20 14	20 26	20 39	20 54
12	18 5	18 21	18 38	18 57	19 8	19 21	19 36	19 55	20 4	20 14	20 25	20 38	20 52
13	18 5	18 21	18 38	18 57	19 8	19 21	19 36	19 54	20 3	20 13	20 24	20 36	20 51
14	18 6	18 21	18 38	18 57	19 8	19 21	19 36	19 54	20 2	20 12	20 23	20 35	20 50
15	18 6	18 21	18 38	18 57	19 8	19 20	19 35	19 53	20 2	20 11	20 22	20 34	20 48
16	18 6	18 22	18 38	18 57	19 8	19 20	19 34	19 52	20 1	20 10	20 21	20 33	20 47
17	18 7	18 22	18 38	18 56	19 7	19 19	19 34	19 51	20 0	20 9	20 19	20 31	20 45
18	18 7	18 22	18 38	18 56	19 7	19 19	19 33	19 50	19 59	20 8	20 18	20 30	20 43
19	18 7	18 22	18 38	18 56	19 6	19 18	19 32	19 49	19 58	20 6	20 17	20 28	20 42
20	18 8	18 22	18 38	18 56	19 6	19 18	19 32	19 48	19 57	20 5	20 15	20 27	20 40
21	18 8	18 22	18 38	18 56	19 6	19 17	19 31	19 47	19 56	20 4	20 14	20 25	20 38
22	18 8	18 23	18 38	18 55	19 5	19 17	19 30	19 46	19 54	20 3	20 12	20 23	20 36
23	18 8	18 23	18 38	18 55	19 5	19 16	19 29	19 45	19 53	20 1	20 11	20 22	20 34
24	18 9	18 23	18 38	18 54	19 4	19 15	19 28	19 44	19 52	20 0	20 9	20 20	20 32
25	18 9	18 23	18 37	18 54	19 4	19 15	19 28	19 43	19 50	19 59	20 8	20 18	20 30
26	18 9	18 23	18 37	18 54	19 3	19 14	19 27	19 42	19 49	19 57	20 6	20 16	20 28
27	18 9	18 23	18 37	18 53	19 2	19 13	19 26	19 41	19 48	19 56	20 4	20 14	20 26
28	18 10	18 23	18 37	18 53	19 2	19 12	19 25	19 40	19 46	19 54	20 3	20 12	20 24
29	18 10	18 23	18 36	18 52	19 1	19 12	19 24	19 38	19 45	19 52	20 1	20 10	20 21
30	18 10	18 23	18 36	18 52	19 0	19 11	19 22	19 37	19 43	19 51	19 59	20 8	20 19
31	18 10	18 23	18 36	18 51	19 0	19 10	19 21	19 35	19 42	19 49	19 57	20 6	20 17
Feb. 1	18 10	18 22	18 36	18 50	18 59	19 9	19 20	19 34	19 40	19 47	19 55	20 4	20 14
2	18 10	18 22	18 35	18 50	18 58	19 8	19 19	19 32	19 39	19 46	19 53	20 2	20 12
3	18 10	18 22	18 35	18 49	18 58	19 7	19 18	19 31	19 37	19 44	19 51	20 0	20 10
4	18 10	18 22	18 35	18 49	18 57	19 6	19 17	19 30	19 36	19 42	19 49	19 58	20 7
5	18 10	18 22	18 34	18 48	18 56	19 5	19 15	19 28	19 34	19 40	19 47	19 56	20 5
6	18 11	18 22	18 34	18 47	18 55	19 4	19 14	19 26	19 32	19 38	19 45	19 53	20 2
7	18 11	18 22	18 33	18 47	18 54	19 3	19 13	19 25	19 30	19 36	19 43	19 51	20 0
8	18 11	18 22	18 33	18 46	18 53	19 2	19 11	19 23	19 28	19 34	19 41	19 49	19 57
9	18 11	18 21	18 32	18 45	18 52	19 0	19 10	19 22	19 27	19 33	19 39	19 46	19 55
10	18 11	18 21	18 32	18 44	18 51	18 59	19 9	19 20	19 25	19 31	19 37	19 44	19 52
11	18 11	18 21	18 32	18 44	18 50	18 58	19 7	19 18	19 23	19 28	19 35	19 42	19 49
12	18 11	18 21	18 31	18 43	18 49	18 57	19 6	19 16	19 21	19 26	19 32	19 39	19 47
13	18 11	18 20	18 30	18 42	18 48	18 56	19 4	19 15	19 19	19 24	19 30	19 37	19 44
14	18 11	18 20	18 30	18 41	18 47	18 54	19 3	19 13	19 17	19 22	19 28	19 34	19 41
15	18 11	18 20	18 29	18 40	18 46	18 53	19 1	19 11	19 15	19 20	19 26	19 32	19 39

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan. 1	6 7	5 50	5 32	5 11	4 59	4 45	4 28	4 8	3 58	3 48	3 35	3 21	3 4
2	6 8	5 51	5 32	5 12	5 0	4 46	4 29	4 9	3 59	3 49	3 36	3 22	3 5
3	6 8	5 51	5 33	5 12	5 0	4 46	4 30	4 10	4 0	3 50	3 38	3 24	3 7
4	6 8	5 51	5 34	5 13	5 1	4 47	4 31	4 11	4 2	3 51	3 39	3 25	3 8
5	6 9	5 52	5 34	5 14	5 2	4 48	4 32	4 12	4 3	3 52	3 40	3 26	3 10
6	6 9	5 53	5 35	5 14	5 3	4 49	4 33	4 13	4 4	3 54	3 42	3 28	3 12
7	6 10	5 53	5 36	5 15	5 4	4 50	4 34	4 14	4 5	3 55	3 43	3 30	3 14
8	6 10	5 54	5 36	5 16	5 4	4 51	4 35	4 16	4 7	3 56	3 45	3 31	3 15
9	6 11	5 54	5 37	5 17	5 5	4 52	4 36	4 17	4 8	3 58	3 46	3 33	3 17
10	6 11	5 55	5 38	5 18	5 6	4 53	4 38	4 18	4 9	3 59	3 48	3 35	3 19
11	6 12	5 55	5 38	5 18	5 7	4 54	4 39	4 20	4 11	4 1	3 50	3 36	3 21
12	6 12	5 56	5 39	5 19	5 8	4 55	4 40	4 21	4 12	4 2	3 51	3 38	3 23
13	6 12	5 56	5 39	5 20	5 9	4 56	4 41	4 22	4 14	4 4	3 53	3 40	3 26
14	6 13	5 57	5 40	5 21	5 10	4 57	4 42	4 24	4 15	4 6	3 55	3 42	3 28
15	6 13	5 57	5 41	5 22	5 11	4 58	4 43	4 25	4 17	4 7	3 56	3 44	3 30
16	6 13	5 58	5 41	5 23	5 12	4 59	4 45	4 27	4 18	4 9	3 58	3 46	3 32
17	6 14	5 58	5 42	5 24	5 13	5 0	4 46	4 28	4 20	4 11	4 0	3 48	3 34
18	6 14	5 59	5 43	5 24	5 14	5 2	4 47	4 30	4 22	4 12	4 2	3 50	3 37
19	6 14	5 59	5 43	5 25	5 15	5 3	4 49	4 31	4 23	4 14	4 4	3 52	3 39
20	6 14	6 0	5 44	5 26	5 16	5 4	4 50	4 33	4 25	4 16	4 6	3 55	3 41
21	6 15	6 0	5 45	5 27	5 17	5 5	4 51	4 34	4 26	4 18	4 8	3 57	3 44
22	6 15	6 1	5 45	5 28	5 18	5 6	4 52	4 36	4 28	4 20	4 10	3 59	3 46
23	6 16	6 1	5 46	5 29	5 19	5 7	4 54	4 38	4 30	4 22	4 12	4 1	3 49
24	6 16	6 2	5 47	5 30	5 20	5 8	4 55	4 39	4 32	4 24	4 14	4 4	3 51
25	6 16	6 2	5 47	5 30	5 21	5 10	4 57	4 41	4 34	4 25	4 16	4 6	3 54
26	6 16	6 2	5 48	5 31	5 22	5 11	4 58	4 43	4 35	4 27	4 18	4 8	3 56
27	6 16	6 3	5 48	5 32	5 23	5 12	4 59	4 44	4 37	4 29	4 20	4 10	3 59
28	6 17	6 3	5 49	5 33	5 24	5 13	5 1	4 46	4 39	4 31	4 22	4 13	4 1
29	6 17	6 4	5 50	5 34	5 25	5 14	5 2	4 48	4 41	4 33	4 24	4 15	4 4
30	6 17	6 4	5 50	5 35	5 26	5 16	5 4	4 49	4 42	4 35	4 27	4 17	4 6
31	6 17	6 4	5 51	5 36	5 27	5 17	5 5	4 51	4 44	4 37	4 29	4 20	4 9
Feb. 1	6 17	6 5	5 52	5 36	5 28	5 18	5 6	4 53	4 46	4 39	4 31	4 22	4 12
2	6 17	6 5	5 52	5 37	5 29	5 19	5 8	4 54	4 48	4 41	4 33	4 24	4 14
3	6 18	6 5	5 53	5 38	5 30	5 20	5 9	4 56	4 50	4 43	4 35	4 27	4 17
4	6 18	6 6	5 53	5 39	5 31	5 22	5 11	4 58	4 52	4 45	4 38	4 29	4 20
5	6 18	6 6	5 54	5 40	5 32	5 23	5 12	5 0	4 54	4 47	4 40	4 32	4 22
6	6 18	6 6	5 54	5 41	5 33	5 24	5 14	5 1	4 55	4 49	4 42	4 34	4 25
7	6 18	6 7	5 55	5 42	5 34	5 25	5 15	5 3	4 57	4 51	4 44	4 36	4 28
8	6 18	6 7	5 55	5 42	5 35	5 26	5 16	5 5	4 59	4 53	4 46	4 39	4 30
9	6 18	6 7	5 56	5 43	5 36	5 28	5 18	5 6	5 1	4 55	4 49	4 41	4 33
10	6 18	6 8	5 56	5 44	5 37	5 29	5 19	5 8	5 3	4 57	4 51	4 44	4 35
11	6 18	6 8	5 57	5 45	5 38	5 30	5 21	5 10	5 5	4 59	4 53	4 46	4 38
12	6 18	6 8	5 58	5 46	5 39	5 31	5 22	5 12	5 7	5 1	4 55	4 48	4 41
13	6 18	6 8	5 58	5 46	5 40	5 32	5 24	5 13	5 8	5 3	4 57	4 51	4 43
14	6 18	6 8	5 58	5 47	5 41	5 34	5 25	5 15	5 10	5 5	5 0	4 53	4 46
15	6 18	6 8	5 59	5 48	5 42	5 35	5 26	5 17	5 12	5 7	5 2	4 56	4 49
16	6 18	6 9	5 59	5 49	5 43	5 36	5 28	5 18	5 14	5 9	5 4	4 58	4 51

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1912.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Feb. 15	18 11	18 20	18 29	18 40	18 46	18 53	19 1	19 11	19 15	19 20	19 26	19 32	19 39
16	18 11	18 20	18 29	18 39	18 45	18 52	19 0	19 9	19 14	19 18	19 23	19 29	19 36
17	18 11	18 19	18 28	18 38	18 44	18 51	18 58	19 7	19 12	19 16	19 21	19 27	19 33
18	18 11	18 19	18 28	18 37	18 43	18 49	18 57	19 5	19 10	19 14	19 19	19 24	19 30
19	18 10	18 19	18 27	18 36	18 42	18 48	18 55	19 4	19 7	19 12	19 16	19 22	19 28
20	18 10	18 18	18 26	18 36	18 41	18 47	18 54	19 2	19 5	19 10	19 14	19 19	19 25
21	18 10	18 18	18 26	18 35	18 40	18 45	18 52	19 0	19 3	19 7	19 12	19 17	19 22
22	18 10	18 17	18 25	18 34	18 38	18 44	18 50	18 58	19 1	19 5	19 9	19 14	19 19
23	18 10	18 17	18 24	18 33	18 37	18 42	18 48	18 56	18 59	19 3	19 7	19 11	19 16
24	18 10	18 17	18 24	18 32	18 36	18 41	18 47	18 54	18 57	19 0	19 4	19 9	19 14
25	18 10	18 16	18 23	18 30	18 35	18 40	18 45	18 52	18 55	18 58	19 2	19 6	19 11
26	18 10	18 16	18 22	18 29	18 34	18 38	18 44	18 50	18 53	18 56	18 59	19 3	19 8
27	18 9	18 15	18 22	18 28	18 32	18 37	18 42	18 48	18 51	18 54	18 57	19 1	19 5
28	18 9	18 15	18 21	18 27	18 31	18 35	18 40	18 46	18 48	18 51	18 54	18 58	19 2
Mar. 1	18 9	18 14	18 20	18 26	18 30	18 34	18 38	18 44	18 46	18 49	18 52	18 55	18 59
2	18 9	18 14	18 19	18 25	18 28	18 32	18 37	18 42	18 44	18 47	18 49	18 53	18 56
3	18 9	18 14	18 18	18 24	18 27	18 31	18 35	18 40	18 42	18 44	18 47	18 50	18 53
4	18 8	18 13	18 18	18 23	18 26	18 29	18 33	18 38	18 40	18 42	18 44	18 47	18 50
5	18 8	18 12	18 17	18 22	18 25	18 28	18 31	18 36	18 37	18 40	18 42	18 44	18 47
6	18 8	18 12	18 16	18 21	18 23	18 26	18 30	18 33	18 35	18 37	18 39	18 42	18 44
7	18 8	18 12	18 15	18 20	18 22	18 25	18 28	18 31	18 33	18 35	18 37	18 39	18 41
8	18 8	18 11	18 14	18 18	18 20	18 23	18 26	18 29	18 30	18 32	18 34	18 36	18 38
9	18 7	18 10	18 14	18 17	18 19	18 21	18 24	18 27	18 28	18 30	18 31	18 33	18 35
10	18 7	18 10	18 13	18 16	18 18	18 20	18 22	18 25	18 26	18 27	18 29	18 30	18 32
11	18 7	18 9	18 12	18 15	18 16	18 18	18 20	18 23	18 24	18 25	18 26	18 28	18 29
12	18 6	18 9	18 11	18 14	18 15	18 17	18 18	18 20	18 21	18 22	18 24	18 25	18 26
13	18 6	18 8	18 10	18 13	18 14	18 15	18 17	18 18	18 19	18 20	18 21	18 22	18 23
14	18 6	18 8	18 9	18 11	18 12	18 14	18 15	18 16	18 17	18 18	18 18	18 19	18 20
15	18 6	18 7	18 9	18 10	18 11	18 12	18 13	18 14	18 15	18 15	18 16	18 16	18 17
16	18 5	18 6	18 8	18 9	18 10	18 10	18 11	18 12	18 12	18 13	18 13	18 14	18 14
17	18 5	18 6	18 7	18 8	18 8	18 9	18 9	18 10	18 10	18 10	18 11	18 11	18 11
18	18 5	18 5	18 6	18 7	18 7	18 7	18 7	18 8	18 8	18 8	18 8	18 8	18 8
19	18 4	18 5	18 5	18 5	18 5	18 6	18 5	18 5	18 5	18 5	18 5	18 5	18 5
20	18 4	18 4	18 4	18 4	18 4	18 4	18 4	18 3	18 3	18 3	18 3	18 2	18 2
21	18 4	18 4	18 3	18 3	18 3	18 2	18 2	18 1	18 1	18 0	18 0	18 0	17 59
22	18 4	18 3	18 2	18 2	18 1	18 1	18 0	17 59	17 58	17 58	17 57	17 57	17 56
23	18 3	18 2	18 2	18 0	18 0	17 59	17 58	17 57	17 56	17 55	17 55	17 54	17 53
24	18 3	18 2	18 1	17 59	17 58	17 57	17 56	17 54	17 54	17 53	17 52	17 51	17 50
25	18 3	18 1	18 0	17 58	17 57	17 56	17 54	17 52	17 52	17 50	17 50	17 48	17 47
26	18 2	18 1	17 59	17 57	17 56	17 54	17 52	17 50	17 49	17 48	17 47	17 46	17 44
27	18 2	18 0	17 58	17 56	17 54	17 52	17 50	17 48	17 47	17 46	17 44	17 43	17 41
28	18 2	18 0	17 57	17 54	17 53	17 51	17 48	17 46	17 44	17 43	17 41	17 40	17 38
29	18 2	17 59	17 56	17 53	17 51	17 49	17 47	17 44	17 42	17 41	17 39	17 37	17 35
30	18 1	17 58	17 56	17 52	17 50	17 48	17 45	17 41	17 40	17 38	17 36	17 34	17 32
31	18 1	17 58	17 55	17 51	17 48	17 46	17 43	17 39	17 38	17 36	17 34	17 31	17 29
Apr. 1	18 1	17 57	17 54	17 50	17 47	17 44	17 41	17 37	17 35	17 33	17 31	17 28	17 26
2	*18 0*	17 57	17 53	17 48	17 46	17 43	17 39	17 35	17 33	17 31	17 28	17 26	17 23

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 720.

Date \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Feb. 16	6 18	6 9	5 59	5 49	5 43	5 36	5 28	5 18	5 14	5 9	5 4	4 58	4 51
17	6 18	6 9	6 0	5 50	5 44	5 37	5 29	5 20	5 16	5 11	5 6	5 0	4 54
18	6 18	6 9	6 0	5 50	5 45	5 38	5 31	5 22	5 18	5 13	5 8	5 3	4 56
19	6 18	6 9	6 1	5 51	5 46	5 40	5 32	5 24	5 20	5 15	5 10	5 5	4 59
20	6 17	6 10	6 1	5 52	5 47	5 41	5 34	5 25	5 22	5 17	5 13	5 7	5 2
21	6 17	6 10	6 2	5 53	5 48	5 42	5 35	5 27	5 23	5 19	5 15	5 10	5 4
22	6 17	6 10	6 2	5 53	5 48	5 43	5 36	5 29	5 25	5 21	5 17	5 12	5 7
23	6 17	6 10	6 3	5 54	5 49	5 44	5 38	5 30	5 27	5 23	5 19	5 14	5 9
24	6 17	6 10	6 3	5 55	5 50	5 45	5 39	5 32	5 29	5 25	5 21	5 17	5 12
25	6 17	6 10	6 3	5 56	5 51	5 46	5 40	5 34	5 31	5 27	5 23	5 19	5 14
26	6 17	6 10	6 4	5 56	5 52	5 47	5 42	5 35	5 32	5 29	5 26	5 22	5 17
27	6 16	6 10	6 4	5 57	5 53	5 49	5 43	5 37	5 34	5 31	5 28	5 24	5 20
28	6 16	6 10	6 4	5 58	5 54	5 50	5 44	5 39	5 36	5 33	5 30	5 26	5 22
Mar. 1	6 16	6 10	6 5	5 58	5 55	5 51	5 46	5 40	5 38	5 35	5 32	5 28	5 25
2	6 16	6 10	6 5	5 59	5 56	5 52	5 47	5 42	5 40	5 37	5 34	5 31	5 27
3	6 16	6 11	6 6	6 0	5 56	5 53	5 49	5 44	5 42	5 39	5 36	5 33	5 30
4	6 15	6 11	6 6	6 0	5 57	5 54	5 50	5 45	5 43	5 41	5 38	5 35	5 32
5	6 15	6 11	6 6	6 1	5 58	5 55	5 51	5 47	5 45	5 43	5 40	5 38	5 35
6	6 15	6 11	6 7	6 2	5 59	5 56	5 53	5 49	5 47	5 45	5 43	5 40	5 37
7	6 15	6 11	6 7	6 3	6 0	5 57	5 54	5 50	5 49	5 47	5 45	5 42	5 40
8	6 14	6 11	6 7	6 3	6 1	5 58	5 55	5 52	5 50	5 49	5 47	5 45	5 42
9	6 14	6 11	6 8	6 4	6 2	5 59	5 57	5 54	5 52	5 51	5 49	5 47	5 45
10	6 14	6 11	6 8	6 4	6 2	6 0	5 58	5 55	5 54	5 52	5 51	5 49	5 47
11	6 14	6 11	6 8	6 5	6 3	6 1	5 59	5 57	5 56	5 54	5 53	5 51	5 50
12	6 13	6 11	6 8	6 6	6 4	6 2	6 1	5 58	5 57	5 56	5 55	5 54	5 52
13	6 13	6 11	6 9	6 6	6 5	6 4	6 2	6 0	5 59	5 58	5 57	5 56	5 55
14	6 13	6 11	6 9	6 7	6 6	6 5	6 3	6 2	6 1	6 0	5 59	5 58	5 57
15	6 13	6 11	6 10	6 8	6 7	6 6	6 5	6 3	6 3	6 2	6 1	6 1	6 0
16	6 12	6 11	6 10	6 8	6 8	6 7	6 6	6 5	6 4	6 4	6 3	6 3	6 2
17	6 12	6 11	6 10	6 9	6 8	6 8	6 7	6 6	6 6	6 6	6 5	6 5	6 4
18	6 12	6 11	6 10	6 10	6 9	6 9	6 8	6 8	6 8	6 8	6 8	6 7	6 7
19	6 12	6 11	6 11	6 10	6 10	6 10	6 10	6 10	6 10	6 10	6 10	6 10	6 9
20	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 11	6 12	6 12	6 12	6 12
21	6 11	6 11	6 11	6 11	6 12	6 12	6 12	6 13	6 13	6 13	6 14	6 14	6 14
22	6 10	6 11	6 11	6 12	6 12	6 13	6 14	6 14	6 15	6 15	6 16	6 16	6 17
23	6 10	6 11	6 12	6 13	6 13	6 14	6 15	6 16	6 16	6 17	6 18	6 18	6 19
24	6 10	6 11	6 12	6 13	6 14	6 15	6 16	6 18	6 18	6 19	6 20	6 21	6 22
25	6 10	6 11	6 12	6 14	6 15	6 16	6 17	6 19	6 20	6 21	6 22	6 23	6 24
26	6 9	6 11	6 12	6 14	6 16	6 17	6 19	6 21	6 22	6 23	6 24	6 25	6 26
27	6 9	6 11	6 13	6 15	6 16	6 18	6 20	6 22	6 23	6 25	6 26	6 27	6 29
28	6 9	6 11	6 13	6 16	6 17	6 19	6 21	6 24	6 25	6 26	6 28	6 30	6 31
29	6 8	6 11	6 13	6 16	6 18	6 20	6 22	6 25	6 27	6 28	6 30	6 32	6 34
30	6 8	6 11	6 14	6 17	6 19	6 21	6 24	6 27	6 28	6 30	6 32	6 34	6 36
31	6 8	6 11	6 14	6 18	6 20	6 22	6 25	6 28	6 30	6 32	6 34	6 36	6 39
Apr. 1	6 8	6 11	6 14	6 18	6 20	6 23	6 26	6 30	6 32	6 34	6 36	6 38	6 41
2	6 7	6 10	6 14	6 19	6 21	6 24	6 28	6 32	6 34	6 36	6 38	6 41	6 44
3	6 7	6 10	6 15	6 19	6 22	6 25	6 29	6 33	6 35	6 38	6 40	6 43	6 46

TABLE VIII.

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr. 1	18 1	17 57	17 54	17 50	17 47	17 44	17 41	17 37	17 35	17 33	17 31	17 28	17 26
2	18 0	17 57	17 53	17 48	17 46	17 43	17 39	17 35	17 33	17 31	17 28	17 26	17 23
3	18 0	17 56	17 52	17 47	17 44	17 41	17 37	17 33	17 31	17 28	17 26	17 23	17 20
4	18 0	17 56	17 51	17 46	17 43	17 40	17 35	17 30	17 28	17 26	17 23	17 20	17 17
5	17 59	17 55	17 50	17 45	17 42	17 38	17 34	17 28	17 26	17 23	17 20	17 17	17 14
6	17 59	17 54	17 50	17 44	17 40	17 36	17 32	17 26	17 24	17 21	17 18	17 14	17 10
7	17 59	17 54	17 49	17 42	17 39	17 35	17 30	17 24	17 22	17 18	17 15	17 12	17 7
8	17 58	17 53	17 48	17 41	17 38	17 33	17 28	17 22	17 19	17 16	17 13	17 9	17 4
9	17 58	17 53	17 47	17 41	17 36	17 32	17 26	17 20	17 17	17 14	17 10	17 6	17 2
10	17 58	17 52	17 46	17 39	17 35	17 30	17 24	17 18	17 15	17 11	17 8	17 3	16 59
11	17 58	17 52	17 45	17 38	17 34	17 29	17 23	17 16	17 12	17 9	17 5	17 1	16 56
12	17 57	17 51	17 45	17 37	17 32	17 27	17 21	17 14	17 10	17 7	17 2	16 58	16 53
13	17 57	17 51	17 44	17 36	17 31	17 26	17 19	17 12	17 8	17 4	17 0	16 55	16 50
14	17 57	17 50	17 43	17 34	17 30	17 24	17 17	17 10	17 6	17 2	16 57	16 52	16 47
15	17 57	17 50	17 42	17 33	17 28	17 22	17 16	17 8	17 4	17 0	16 55	16 50	16 44
16	17 56	17 49	17 41	17 32	17 27	17 21	17 14	17 5	17 1	16 57	16 52	16 47	16 41
17	17 56	17 49	17 41	17 31	17 26	17 20	17 12	17 3	16 59	16 55	16 50	16 44	16 38
18	17 56	17 48	17 40	17 30	17 24	17 18	17 10	17 1	16 57	16 52	16 47	16 42	16 35
19	17 56	17 48	17 39	17 29	17 23	17 16	17 9	16 59	16 55	16 50	16 45	16 39	16 32
20	17 55	17 47	17 38	17 28	17 22	17 15	17 7	16 57	16 53	16 48	16 42	16 36	16 29
21	17 55	17 47	17 38	17 27	17 21	17 14	17 5	16 55	16 51	16 46	16 40	16 34	16 26
22	17 55	17 46	17 37	17 26	17 20	17 12	17 4	16 53	16 49	16 43	16 37	16 31	16 23
23	17 55	17 46	17 36	17 25	17 18	17 11	17 2	16 51	16 46	16 41	16 35	16 28	16 20
24	17 55	17 45	17 35	17 24	17 17	17 10	17 0	16 50	16 44	16 39	16 33	16 26	16 18
25	17 54	17 45	17 35	17 23	17 16	17 8	16 59	16 48	16 42	16 37	16 30	16 23	16 15
26	17 54	17 45	17 34	17 22	17 15	17 7	16 57	16 46	16 40	16 34	16 28	16 20	16 12
27	17 54	17 44	17 33	17 21	17 14	17 5	16 56	16 44	16 38	16 32	16 25	16 18	16 9
28	17 54	17 44	17 33	17 20	17 13	17 4	16 54	16 42	16 36	16 30	16 23	16 15	16 6
29	17 54	17 43	17 32	17 19	17 11	17 3	16 52	16 40	16 34	16 28	16 21	16 13	16 4
30	17 54	17 43	17 32	17 18	17 10	17 2	16 51	16 38	16 32	16 26	16 18	16 10	16 1
May 1	17 54	17 43	17 31	17 17	17 9	17 0	16 50	16 37	16 30	16 24	16 16	16 8	15 58
2	17 54	17 42	17 30	17 16	17 8	16 59	16 48	16 35	16 29	16 22	16 14	16 5	15 55
3	17 53	17 42	17 30	17 16	17 7	16 58	16 46	16 33	16 27	16 20	16 12	16 3	15 53
4	17 53	17 42	17 29	17 15	17 6	16 57	16 45	16 31	16 25	16 18	16 10	16 0	15 50
5	17 53	17 41	17 28	17 14	17 5	16 55	16 44	16 30	16 23	16 16	16 7	15 58	15 47
6	17 53	17 41	17 28	17 13	17 4	16 54	16 42	16 28	16 21	16 14	16 5	15 56	15 45
7	17 53	17 41	17 28	17 12	17 3	16 53	16 41	16 26	16 19	16 12	16 3	15 53	15 42
8	17 53	17 40	17 27	17 11	17 2	16 52	16 40	16 25	16 18	16 10	16 1	15 51	15 40
9	17 53	17 40	17 26	17 11	17 1	16 51	16 38	16 23	16 16	16 8	15 59	15 49	15 37
10	17 53	17 40	17 26	17 10	17 0	16 50	16 37	16 22	16 14	16 6	15 57	15 46	15 34
11	17 53	17 40	17 26	17 9	17 0	16 49	16 36	16 20	16 12	16 4	15 55	15 44	15 32
12	17 53	17 40	17 26	17 9	16 59	16 48	16 34	16 18	16 11	16 2	15 53	15 42	15 29
13	17 53	17 39	17 25	17 8	16 58	16 47	16 33	16 17	16 9	16 1	15 51	15 40	15 27
14	17 53	17 39	17 24	17 7	16 57	16 46	16 32	16 16	16 8	15 59	15 49	15 38	15 25
15	17 53	17 39	17 24	17 7	16 56	16 45	16 31	16 14	16 6	15 57	15 47	15 36	15 22
16	17 53	17 39	17 24	17 6	16 56	16 44	16 30	16 13	16 5	15 56	15 45	15 34	15 20
17	*17 53*	17 38	17 23	17 5	16 55	16 43	16 29	16 11	16 3	15 54	15 44	15 32	15 18

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

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For sunset in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr. 2	6 7	6 10	6 14	6 19	6 21	6 24	6 28	6 32	6 34	6 36	6 38	6 41	6 44
3	6 7	6 10	6 15	6 19	6 22	6 25	6 29	6 33	6 35	6 38	6 40	6 43	6 46
4	6 7	6 10	6 15	6 20	6 23	6 26	6 30	6 35	6 37	6 40	6 42	6 45	6 48
5	6 6	6 10	6 15	6 20	6 24	6 27	6 31	6 36	6 39	6 41	6 44	6 47	6 51
6	6 6	6 10	6 15	6 21	6 24	6 28	6 33	6 38	6 40	6 43	6 46	6 50	6 53
7	6 6	6 10	6 16	6 22	6 25	6 29	6 34	6 39	6 42	6 45	6 48	6 52	6 56
8	6 6	6 10	6 16	6 22	6 26	6 30	6 35	6 41	6 44	6 47	6 50	6 54	6 58
9	6 5	6 10	6 16	6 23	6 27	6 31	6 36	6 43	6 46	6 49	6 52	6 56	7 1
10	6 5	6 10	6 16	6 24	6 28	6 32	6 38	6 44	6 47	6 50	6 54	6 58	7 3
11	6 5	6 10	6 17	6 24	6 28	6 33	6 39	6 46	6 49	6 52	6 56	7 1	7 6
12	6 4	6 10	6 17	6 25	6 29	6 34	6 40	6 47	6 51	6 54	6 58	7 3	7 8
13	6 4	6 10	6 17	6 25	6 30	6 35	6 42	6 49	6 52	6 56	7 0	7 5	7 10
14	6 4	6 10	6 18	6 26	6 31	6 36	6 43	6 50	6 54	6 58	7 2	7 7	7 13
15	6 4	6 10	6 18	6 26	6 32	6 37	6 44	6 52	6 56	7 0	7 4	7 9	7 15
16	6 3	6 10	6 18	6 27	6 32	6 38	6 45	6 54	6 58	7 2	7 6	7 12	7 18
17	6 3	6 10	6 18	6 28	6 33	6 39	6 46	6 55	6 59	7 4	7 8	7 14	7 20
18	6 3	6 10	6 19	6 28	6 34	6 40	6 48	6 57	7 1	7 5	7 10	7 16	7 23
19	6 3	6 11	6 19	6 29	6 35	6 41	6 49	6 58	7 3	7 7	7 12	7 18	7 25
20	6 2	6 11	6 19	6 30	6 36	6 42	6 50	7 0	7 4	7 9	7 14	7 21	7 28
21	6 2	6 11	6 20	6 30	6 36	6 43	6 52	7 1	7 6	7 11	7 17	7 23	7 30
22	6 2	6 11	6 20	6 31	6 37	6 44	6 53	7 3	7 8	7 13	7 19	7 25	7 33
23	6 2	6 11	6 20	6 31	6 38	6 45	6 54	7 4	7 9	7 15	7 21	7 27	7 35
24	6 2	6 11	6 21	6 32	6 39	6 46	6 55	7 6	7 11	7 17	7 23	7 30	7 38
25	6 2	6 11	6 21	6 33	6 40	6 47	6 57	7 8	7 13	7 18	7 25	7 32	7 40
26	6 1	6 11	6 21	6 33	6 40	6 48	6 58	7 9	7 14	7 20	7 27	7 34	7 42
27	6 1	6 11	6 22	6 34	6 41	6 49	6 59	7 11	7 16	7 22	7 29	7 36	7 45
28	6 1	6 11	6 22	6 35	6 42	6 50	7 0	7 12	7 18	7 24	7 31	7 39	7 47
29	6 1	6 11	6 22	6 35	6 43	6 51	7 2	7 14	7 19	7 26	7 33	7 41	7 50
30	6 1	6 11	6 23	6 36	6 44	6 52	7 3	7 15	7 21	7 28	7 35	7 43	7 52
May 1	6 1	6 12	6 23	6 37	6 44	6 53	7 4	7 17	7 23	7 30	7 37	7 45	7 55
2	6 0	6 12	6 23	6 37	6 45	6 54	7 5	7 18	7 24	7 31	7 39	7 48	7 57
3	6 0	6 12	6 24	6 38	6 46	6 55	7 7	7 20	7 26	7 33	7 41	7 50	8 0
4	6 0	6 12	6 24	6 38	6 47	6 56	7 8	7 21	7 28	7 35	7 43	7 52	8 2
5	6 0	6 12	6 25	6 39	6 48	6 57	7 9	7 23	7 30	7 37	7 45	7 54	8 5
6	6 0	6 12	6 25	6 40	6 49	6 58	7 10	7 24	7 31	7 39	7 47	7 56	8 7
7	6 0	6 12	6 25	6 40	6 49	6 59	7 12	7 26	7 33	7 40	7 49	7 58	8 10
8	6 0	6 12	6 26	6 41	6 50	7 0	7 13	7 28	7 34	7 42	7 51	8 1	8 12
9	6 0	6 12	6 26	6 42	6 51	7 1	7 14	7 29	7 36	7 44	7 53	8 3	8 15
10	6 0	6 13	6 26	6 42	6 52	7 2	7 15	7 30	7 38	7 46	7 55	8 5	8 17
11	6 0	6 13	6 27	6 43	6 53	7 3	7 16	7 32	7 39	7 48	7 57	8 7	8 20
12	6 0	6 13	6 27	6 44	6 53	7 4	7 17	7 33	7 41	7 49	7 59	8 9	8 22
13	6 0	6 13	6 28	6 44	6 54	7 5	7 19	7 35	7 42	7 51	8 1	8 12	8 24
14	6 0	6 13	6 28	6 45	6 55	7 6	7 20	7 36	7 44	7 53	8 2	8 14	8 27
15	6 0	6 14	6 28	6 46	6 56	7 7	7 21	7 38	7 46	7 54	8 4	8 16	8 29
16	6 0	6 14	6 29	6 46	6 56	7 8	7 22	7 39	7 47	7 56	8 6	8 18	8 31
17	6 0	6 14	6 29	6 47	6 57	7 9	7 23	7 40	7 49	7 58	8 8	8 20	8 34
18	6 0	6 14	6 30	6 48	6 58	7 10	7 24	7 42	7 50	7 59	8 10	8 22	8 38

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1919.

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For sunrise in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May 17	17 53	17 38	17 23	17 5	16 55	16 43	16 29	16 11	16 3	15 54	15 44	15 32	15 18
18	17 53	17 38	17 23	17 5	16 54	16 42	16 28	16 10	16 2	15 52	15 42	15 30	15 16
19	17 53	17 38	17 22	17 4	16 54	16 41	16 27	16 9	16 0	15 51	15 40	15 28	15 13
20	17 53	17 38	17 22	17 4	16 53	16 40	16 26	16 8	15 59	15 49	15 38	15 26	15 11
21	17 53	17 38	17 22	17 3	16 52	16 40	16 25	16 6	15 58	15 48	15 37	15 24	15 9
22	17 53	17 38	17 22	17 3	16 52	16 39	16 24	16 5	15 56	15 46	15 35	15 22	15 7
23	17 53	17 38	17 21	17 2	16 51	16 38	16 23	16 4	15 55	15 45	15 34	15 20	15 5
24	17 53	17 38	17 21	17 2	16 50	16 38	16 22	16 3	15 54	15 44	15 32	15 19	15 3
25	17 53	17 38	17 21	17 1	16 50	16 37	16 21	16 2	15 53	15 42	15 31	15 17	15 1
26	17 53	17 38	17 21	17 1	16 50	16 36	16 20	16 1	15 52	15 41	15 29	15 15	14 59
27	17 53	17 38	17 20	17 1	16 49	16 36	16 20	16 0	15 51	15 40	15 28	15 14	14 57
28	17 54	17 38	17 20	17 0	16 49	16 35	16 19	15 59	15 50	15 39	15 27	15 12	14 56
29	17 54	17 38	17 20	17 0	16 48	16 35	16 18	15 58	15 49	15 38	15 25	15 11	14 54
30	17 54	17 38	17 20	17 0	16 48	16 34	16 18	15 57	15 48	15 37	15 24	15 10	14 52
31	17 54	17 38	17 20	16 59	16 47	16 34	16 17	15 56	15 47	15 36	15 23	15 8	14 50
June 1	17 54	17 38	17 20	16 59	16 47	16 33	16 16	15 56	15 46	15 35	15 22	15 7	14 49
2	17 54	17 38	17 20	16 59	16 47	16 33	16 16	15 55	15 45	15 34	15 21	15 6	14 48
3	17 54	17 38	17 20	16 59	16 46	16 32	16 16	15 54	15 44	15 33	15 20	15 5	14 46
4	17 54	17 38	17 20	16 59	16 46	16 32	16 15	15 54	15 44	15 32	15 19	15 4	14 45
5	17 55	17 38	17 20	16 58	16 46	16 32	16 15	15 53	15 43	15 31	15 18	15 3	14 44
6	17 55	17 38	17 20	16 58	16 46	16 31	16 14	15 53	15 42	15 31	15 17	15 2	14 43
7	17 55	17 38	17 20	16 58	16 46	16 31	16 14	15 52	15 42	15 30	15 16	15 1	14 42
8	17 55	17 38	17 20	16 58	16 46	16 31	16 14	15 52	15 41	15 30	15 16	15 0	14 41
9	17 55	17 38	17 20	16 58	16 45	16 31	16 13	15 51	15 41	15 29	15 15	14 59	14 40
10	17 56	17 38	17 20	16 58	16 45	16 31	16 13	15 51	15 40	15 28	15 15	14 58	14 39
11	17 56	17 38	17 20	16 58	16 45	16 30	16 13	15 51	15 40	15 28	15 14	14 58	14 38
12	17 56	17 39	17 20	16 58	16 45	16 30	16 13	15 50	15 40	15 28	15 14	14 57	14 37
13	17 56	17 39	17 20	16 58	16 45	16 30	16 12	15 50	15 40	15 27	15 13	14 57	14 37
14	17 56	17 39	17 20	16 58	16 45	16 30	16 12	15 50	15 39	15 27	15 13	14 56	14 36
15	17 56	17 39	17 20	16 58	16 45	16 30	16 12	15 50	15 39	15 27	15 13	14 56	14 36
16	17 57	17 39	17 20	16 58	16 45	16 30	16 12	15 50	15 39	15 27	15 13	14 56	14 36
17	17 57	17 40	17 20	16 59	16 45	16 30	16 12	15 50	15 39	15 27	15 12	14 56	14 35
18	17 57	17 40	17 21	16 59	16 46	16 30	16 13	15 50	15 39	15 27	15 12	14 56	14 35
19	17 57	17 40	17 21	16 59	16 46	16 31	16 13	15 50	15 39	15 27	15 12	14 56	14 35
20	17 58	17 40	17 21	16 59	16 46	16 31	16 13	15 50	15 39	15 27	15 13	14 56	14 35
21	17 58	17 40	17 21	16 59	16 46	16 31	16 13	15 50	15 39	15 27	15 13	14 56	14 35
22	17 58	17 40	17 22	16 59	16 46	16 31	16 13	15 51	15 40	15 27	15 13	14 56	14 36
23	17 58	17 41	17 22	17 0	16 46	16 31	16 13	15 51	15 40	15 28	15 13	14 56	14 36
24	17 58	17 41	17 22	17 0	16 47	16 32	16 14	15 51	15 40	15 28	15 14	14 57	14 36
25	17 59	17 41	17 22	17 0	16 47	16 32	16 14	15 52	15 41	15 28	15 14	14 57	14 37
26	17 59	17 41	17 22	17 0	16 48	16 32	16 14	15 52	15 41	15 29	15 15	14 58	14 38
27	17 59	17 42	17 23	17 1	16 48	16 33	16 15	15 52	15 42	15 29	15 15	14 58	14 38
28	17 59	17 42	17 23	17 1	16 48	16 33	16 15	15 53	15 42	15 30	15 16	14 59	14 39
29	18 0	17 42	17 23	17 1	16 48	16 34	16 16	15 53	15 43	15 30	15 16	15 0	14 40
30	18 0	17 42	17 24	17 2	16 49	16 34	16 16	15 54	15 43	15 31	15 17	15 1	14 41
July 1	18 0	17 43	17 24	17 2	16 49	16 34	16 17	15 55	15 44	15 32	15 18	15 2	14 42
2	18 0	17 43	17 24	17 2	16 50	16 35	16 17	15 55	15 45	15 33	15 19	15 3	14 43

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, write P. M. after the astronomical time.

To obtain at any the local time by the number of decrease the local time by the number of minutes the station meridian.

For sunset 720.

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July 1	18 0	17 43	17 24	17 2	16 49	16 34	16 17	15 55	15 44	15 32	15 18	15 2	14 42
2	18 0	17 43	17 24	17 2	16 50	16 35	16 17	15 55	15 45	15 33	15 19	15 3	14 43
3	18 0	17 43	17 25	17 3	16 50	16 36	16 18	15 56	15 45	15 34	15 20	15 4	14 44
4	18 0	17 43	17 25	17 3	16 51	16 36	16 19	15 57	15 46	15 34	15 21	15 5	14 45
5	18 1	17 44	17 25	17 4	16 51	16 37	16 19	15 58	15 47	15 35	15 22	15 6	14 46
6	18 1	17 44	17 26	17 4	16 52	16 37	16 20	15 58	15 48	15 36	15 23	15 7	14 48
7	18 1	17 44	17 26	17 5	16 52	16 38	16 21	15 59	15 49	15 37	15 24	15 8	14 49
8	18 1	17 44	17 26	17 5	16 53	16 38	16 21	16 0	15 50	15 38	15 25	15 10	14 51
9	18 1	17 45	17 27	17 6	16 53	16 39	16 22	16 1	15 51	15 39	15 26	15 11	14 52
10	18 2	17 45	17 27	17 6	16 54	16 40	16 23	16 2	15 52	15 40	15 27	15 12	14 54
11	18 2	17 45	17 27	17 7	16 54	16 40	16 24	16 3	15 53	15 42	15 29	15 14	14 56
12	18 2	17 45	17 28	17 7	16 55	16 41	16 24	16 4	15 54	15 43	15 30	15 15	14 57
13	18 2	17 46	17 28	17 8	16 56	16 42	16 25	16 5	15 55	15 44	15 32	15 17	14 59
14	18 2	17 46	17 28	17 8	16 56	16 43	16 26	16 6	15 56	15 45	15 33	15 18	15 1
15	18 2	17 46	17 29	17 9	16 57	16 43	16 27	16 7	15 58	15 47	15 34	15 20	15 3
16	18 2	17 46	17 29	17 9	16 58	16 44	16 28	16 8	15 59	15 48	15 36	15 22	15 5
17	18 2	17 47	17 30	17 10	16 58	16 45	16 29	16 9	16 0	15 49	15 37	15 24	15 7
18	18 2	17 47	17 30	17 10	16 59	16 46	16 30	16 10	16 1	15 51	15 39	15 25	15 9
19	18 2	17 47	17 30	17 11	17 0	16 46	16 31	16 12	16 2	15 52	15 41	15 27	15 11
20	18 3	17 47	17 31	17 12	17 0	16 47	16 32	16 13	16 4	15 54	15 42	15 29	15 13
21	18 3	17 48	17 31	17 12	17 1	16 48	16 33	16 14	16 5	15 55	15 44	15 31	15 15
22	18 3	17 48	17 32	17 13	17 2	16 49	16 34	16 15	16 7	15 57	15 45	15 33	15 17
23	18 3	17 48	17 32	17 13	17 2	16 50	16 35	16 17	16 8	15 58	15 47	15 34	15 20
24	18 3	17 48	17 32	17 14	17 3	16 51	16 36	16 18	16 9	16 0	15 49	15 36	15 22
25	18 3	17 48	17 33	17 14	17 4	16 52	16 37	16 19	16 11	16 1	15 51	15 38	15 24
26	18 3	17 48	17 33	17 15	17 5	16 52	16 38	16 20	16 12	16 3	15 52	15 40	15 26
27	18 3	17 49	17 33	17 16	17 5	16 53	16 39	16 22	16 14	16 5	15 54	15 42	15 28
28	18 3	17 49	17 34	17 16	17 6	16 54	16 40	16 23	16 15	16 6	15 56	15 44	15 31
29	18 3	17 49	17 34	17 17	17 7	16 55	16 42	16 25	16 17	16 8	15 58	15 46	15 33
30	18 3	17 49	17 34	17 18	17 8	16 56	16 43	16 26	16 18	16 10	16 0	15 48	15 35
31	18 3	17 49	17 35	17 18	17 8	16 57	16 44	16 27	16 20	16 11	16 1	15 51	15 38
Aug. 1	18 3	17 50	17 35	17 19	17 9	16 58	16 45	16 29	16 21	16 13	16 3	15 53	15 40
2	18 3	17 50	17 36	17 19	17 10	16 59	16 46	16 30	16 23	16 15	16 5	15 55	15 42
3	18 3	17 50	17 36	17 20	17 10	17 0	16 47	16 32	16 24	16 16	16 7	15 57	15 45
4	18 2	17 50	17 36	17 20	17 11	17 1	16 48	16 33	16 26	16 18	16 9	15 59	15 47
5	18 2	17 50	17 36	17 21	17 12	17 2	16 50	16 34	16 28	16 20	16 11	16 1	15 50
6	18 2	17 50	17 37	17 22	17 13	17 3	16 51	16 36	16 29	16 21	16 13	16 3	15 52
7	18 2	17 50	17 37	17 22	17 14	17 4	16 52	16 37	16 31	16 23	16 15	16 5	15 54
8	18 2	17 50	17 38	17 23	17 14	17 5	16 53	16 39	16 32	16 25	16 17	16 8	15 57
9	18 2	17 50	17 38	17 24	17 15	17 6	16 54	16 40	16 34	16 27	16 19	16 10	15 59
10	18 2	17 50	17 38	17 24	17 16	17 6	16 55	16 42	16 36	16 28	16 21	16 12	16 2
11	18 2	17 51	17 38	17 25	17 17	17 7	16 57	16 43	16 37	16 30	16 23	16 14	16 4
12	18 2	17 51	17 39	17 25	17 17	17 8	16 58	16 45	16 39	16 32	16 24	16 16	16 6
13	18 1	17 51	17 39	17 26	17 18	17 9	16 59	16 46	16 40	16 34	16 26	16 18	16 9
14	18 1	17 51	17 40	17 26	17 19	17 10	17 0	16 48	16 42	16 36	16 28	16 20	16 11
15	18 1	17 51	17 40	17 27	17 20	17 11	17 1	16 49	16 44	16 37	16 30	16 22	16 14
16	18 1	17 51	17 40	17 28	17 20	17 12	17 2	16 51	16 45	16 39	16 32	16 25	16 16

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 720.

Date \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July 2	6 7	6 25	6 43	7 5	7 18	7 33	7 50	8 12	8 23	8 35	8 49	9 5	9 25
3	6 8	6 25	6 43	7 5	7 18	7 32	7 50	8 12	8 23	8 35	8 48	9 5	9 24
4	6 8	6 25	6 43	7 5	7 18	7 32	7 50	8 12	8 22	8 34	8 48	9 4	9 24
5	6 8	6 25	6 43	7 5	7 18	7 32	7 50	8 11	8 22	8 34	8 47	9 3	9 23
6	6 8	6 25	6 43	7 5	7 17	7 32	7 49	8 11	8 21	8 33	8 47	9 2	9 22
7	6 8	6 25	6 43	7 5	7 17	7 32	7 49	8 10	8 21	8 32	8 46	9 1	9 20
8	6 8	6 25	6 43	7 4	7 17	7 31	7 48	8 10	8 20	8 32	8 45	9 0	9 19
9	6 8	6 25	6 43	7 4	7 17	7 31	7 48	8 9	8 19	8 31	8 44	8 59	9 18
10	6 9	6 25	6 43	7 4	7 16	7 31	7 48	8 9	8 19	8 30	8 43	8 58	9 17
11	6 9	6 25	6 43	7 4	7 16	7 30	7 47	8 8	8 18	8 29	8 42	8 57	9 16
12	6 9	6 25	6 43	7 4	7 16	7 30	7 46	8 7	8 17	8 28	8 41	8 56	9 14
13	6 9	6 25	6 43	7 3	7 16	7 29	7 46	8 6	8 16	8 27	8 40	8 55	9 12
14	6 9	6 25	6 43	7 3	7 15	7 29	7 45	8 6	8 15	8 26	8 39	8 53	9 11
15	6 9	6 25	6 43	7 3	7 15	7 28	7 45	8 5	8 14	8 25	8 38	8 52	9 9
16	6 9	6 25	6 42	7 2	7 14	7 28	7 44	8 4	8 13	8 24	8 36	8 51	9 8
17	6 9	6 25	6 42	7 2	7 14	7 27	7 43	8 3	8 12	8 23	8 35	8 49	9 6
18	6 9	6 25	6 42	7 2	7 13	7 27	7 42	8 2	8 11	8 22	8 34	8 47	9 4
19	6 10	6 25	6 42	7 1	7 13	7 26	7 42	8 1	8 10	8 20	8 32	8 46	9 2
20	6 10	6 25	6 42	7 1	7 12	7 25	7 41	8 0	8 9	8 19	8 31	8 44	9 0
21	6 10	6 25	6 41	7 0	7 12	7 25	7 40	7 59	8 8	8 18	8 29	8 42	8 58
22	6 10	6 25	6 41	7 0	7 11	7 24	7 39	7 58	8 6	8 16	8 28	8 41	8 56
23	6 10	6 25	6 41	6 59	7 10	7 23	7 38	7 56	8 5	8 15	8 26	8 39	8 54
24	6 10	6 24	6 40	6 59	7 10	7 22	7 37	7 55	8 4	8 13	8 24	8 37	8 52
25	6 10	6 24	6 40	6 58	7 9	7 21	7 36	7 54	8 2	8 12	8 23	8 35	8 50
26	6 10	6 24	6 40	6 58	7 8	7 21	7 35	7 53	8 1	8 10	8 21	8 33	8 48
27	6 10	6 24	6 39	6 57	7 8	7 20	7 34	7 51	8 0	8 9	8 19	8 31	8 45
28	6 10	6 24	6 39	6 56	7 7	7 19	7 33	7 50	7 58	8 7	8 18	8 29	8 43
29	6 10	6 24	6 39	6 56	7 6	7 18	7 32	7 49	7 56	8 5	8 16	8 27	8 40
30	6 10	6 23	6 38	6 55	7 5	7 17	7 30	7 47	7 55	8 4	8 14	8 25	8 38
31	6 10	6 23	6 38	6 55	7 4	7 16	7 29	7 46	7 54	8 2	8 12	8 23	8 36
Aug. 1	6 10	6 23	6 37	6 54	7 4	7 15	7 28	7 44	7 52	8 0	8 10	8 21	8 33
2	6 9	6 23	6 37	6 53	7 3	7 14	7 27	7 43	7 50	7 58	8 8	8 18	8 31
3	6 9	6 22	6 36	6 52	7 2	7 13	7 26	7 41	7 48	7 57	8 6	8 16	8 28
4	6 9	6 22	6 36	6 52	7 1	7 12	7 24	7 40	7 47	7 55	8 4	8 14	8 26
5	6 9	6 22	6 35	6 51	7 0	7 10	7 23	7 38	7 45	7 53	8 2	8 12	8 23
6	6 9	6 22	6 35	6 50	6 59	7 9	7 21	7 36	7 43	7 51	8 0	8 9	8 21
7	6 9	6 21	6 34	6 49	6 59	7 8	7 20	7 35	7 41	7 49	7 58	8 7	8 18
8	6 9	6 21	6 34	6 48	6 57	7 7	7 19	7 33	7 40	7 47	7 55	8 5	8 15
9	6 9	6 20	6 33	6 48	6 56	7 6	7 17	7 31	7 38	7 45	7 53	8 2	8 13
10	6 9	6 20	6 32	6 47	6 55	7 5	7 16	7 29	7 36	7 43	7 51	8 0	8 10
11	6 8	6 20	6 32	6 46	6 54	7 3	7 14	7 28	7 34	7 41	7 49	7 57	8 7
12	6 8	6 19	6 31	6 45	6 53	7 2	7 13	7 26	7 32	7 39	7 46	7 55	8 5
13	6 8	6 19	6 30	6 44	6 52	7 1	7 11	7 24	7 30	7 37	7 44	7 52	8 2
14	6 8	6 18	6 30	6 43	6 51	7 0	7 10	7 22	7 28	7 35	7 42	7 50	7 59
15	6 8	6 18	6 29	6 42	6 50	6 58	7 8	7 20	7 26	7 32	7 40	7 47	7 56
16	6 8	6 18	6 28	6 41	6 48	6 57	7 6	7 18	7 24	7 30	7 37	7 45	7 54
17	6 7	6 17	6 28	6 40	6 47	6 56	7 5	7 17	7 22	7 28	7 35	7 42	7 51

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any the local time by the number of is west of decrease the local time by the number of

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

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For sunset in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Aug. 17	6 7	6 17	6 28	6 40	6 47	6 56	7 5	7 17	7 22	7 28	7 35	7 42	7 51
18	6 7	6 17	6 27	6 39	6 46	6 54	7 3	7 15	7 20	7 26	7 32	7 40	7 48
19	6 7	6 16	6 26	6 38	6 45	6 53	7 2	7 13	7 18	7 24	7 30	7 37	7 45
20	6 7	6 16	6 26	6 37	6 44	6 51	7 0	7 11	7 16	7 21	7 28	7 34	7 42
21	6 6	6 15	6 25	6 36	6 42	6 50	6 58	7 9	7 14	7 19	7 25	7 32	7 39
22	6 6	6 15	6 24	6 35	6 41	6 48	6 57	7 7	7 12	7 17	7 23	7 29	7 36
23	6 6	6 14	6 23	6 34	6 40	6 47	6 55	7 5	7 10	7 15	7 20	7 27	7 34
24	6 6	6 14	6 23	6 33	6 39	6 46	6 53	7 3	7 8	7 12	7 18	7 24	7 31
25	6 6	6 13	6 22	6 32	6 38	6 44	6 52	7 1	7 5	7 10	7 15	7 21	7 28
26	6 5	6 13	6 21	6 31	6 36	6 43	6 50	6 59	7 3	7 8	7 13	7 18	7 25
27	6 5	6 12	6 20	6 29	6 35	6 41	6 48	6 57	7 1	7 5	7 10	7 16	7 22
28	6 5	6 12	6 19	6 28	6 34	6 40	6 46	6 55	6 59	7 3	7 8	7 13	7 19
29	6 4	6 11	6 18	6 27	6 32	6 38	6 45	6 53	6 56	7 0	7 5	7 10	7 16
30	6 4	6 10	6 18	6 26	6 31	6 36	6 43	6 51	6 54	6 58	7 2	7 8	7 13
31	6 4	6 10	6 17	6 25	6 30	6 35	6 41	6 48	6 52	6 56	7 0	7 5	7 10
Sept. 1	6 3	6 9	6 16	6 24	6 28	6 33	6 39	6 46	6 50	6 53	6 57	7 2	7 7
2	6 3	6 9	6 15	6 22	6 27	6 32	6 37	6 44	6 48	6 51	6 55	6 59	7 4
3	6 3	6 8	6 14	6 21	6 26	6 30	6 36	6 42	6 45	6 49	6 52	6 56	7 1
4	6 2	6 8	6 13	6 20	6 24	6 28	6 34	6 40	6 43	6 46	6 50	6 54	6 58
5	6 2	6 7	6 13	6 19	6 23	6 27	6 32	6 38	6 41	6 44	6 47	6 51	6 55
6	6 2	6 6	6 12	6 18	6 21	6 25	6 30	6 36	6 38	6 41	6 44	6 48	6 52
7	6 2	6 6	6 11	6 16	6 20	6 24	6 28	6 34	6 36	6 39	6 42	6 45	6 49
8	6 1	6 5	6 10	6 15	6 18	6 22	6 26	6 31	6 34	6 36	6 39	6 42	6 46
9	6 1	6 5	6 9	6 14	6 17	6 20	6 24	6 29	6 31	6 34	6 36	6 40	6 43
10	6 0	6 4	6 8	6 13	6 16	6 19	6 22	6 27	6 29	6 31	6 34	6 37	6 40
11	6 0	6 3	6 7	6 12	6 14	6 17	6 21	6 25	6 27	6 29	6 31	6 34	6 37
12	6 0	6 3	6 6	6 10	6 13	6 16	6 19	6 23	6 24	6 26	6 29	6 31	6 34
13	5 59	6 2	6 5	6 9	6 11	6 14	6 17	6 21	6 22	6 24	6 26	6 28	6 31
14	5 59	6 2	6 4	6 8	6 10	6 12	6 15	6 18	6 20	6 22	6 23	6 26	6 28
15	5 59	6 1	6 4	6 7	6 9	6 11	6 13	6 16	6 18	6 19	6 21	6 23	6 25
16	5 58	6 0	6 3	6 5	6 7	6 9	6 11	6 14	6 15	6 16	6 18	6 20	6 22
17	5 58	6 0	6 2	6 4	6 6	6 7	6 9	6 12	6 13	6 14	6 15	6 17	6 18
18	5 58	5 59	6 1	6 3	6 4	6 6	6 7	6 10	6 10	6 11	6 13	6 14	6 15
19	5 57	5 58	6 0	6 2	6 3	6 4	6 5	6 7	6 8	6 9	6 10	6 11	6 12
20	5 57	5 58	5 59	6 0	6 1	6 2	6 4	6 5	6 6	6 6	6 7	6 8	6 9
21	5 56	5 57	5 58	5 59	6 0	6 1	6 2	6 3	6 3	6 4	6 4	6 6	6 6
22	5 56	5 57	5 57	5 58	5 58	5 59	6 0	6 1	6 1	6 2	6 2	6 3	6 3
23	5 56	5 56	5 56	5 57	5 57	5 57	5 58	5 58	5 59	5 59	5 59	6 0	6 0
24	5 56	5 55	5 55	5 56	5 56	5 56	5 56	5 56	5 56	5 56	5 57	5 57	5 57
25	5 55	5 55	5 54	5 54	5 54	5 54	5 54	5 54	5 54	5 54	5 54	5 54	5 54
26	5 55	5 54	5 54	5 53	5 53	5 52	5 52	5 52	5 52	5 52	5 51	5 51	5 51
27	5 54	5 54	5 53	5 52	5 51	5 51	5 50	5 50	5 49	5 49	5 49	5 48	5 48
28	5 54	5 53	5 52	5 50	5 50	5 49	5 48	5 47	5 47	5 46	5 46	5 46	5 45
29	5 54	5 52	5 51	5 49	5 48	5 48	5 46	5 45	5 45	5 44	5 43	5 43	5 42
30	5 54	5 52	5 50	5 48	5 47	5 46	5 44	5 43	5 42	5 42	5 41	5 40	5 39
Oct. 1	5 53	5 51	5 49	5 47	5 46	5 44	5 43	5 41	5 40	5 39	5 38	5 37	5 36
2	5 53	5 50	5 48	5 46	5 44	5 43	5 41	5 39	5 38	5 37	5 36	5 34	5 3[illegible]

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1916.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunrise in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 1	17 46	17 49	17 51	17 53	17 55	17 56	17 58	18 0	18 0	18 2	18 3	18 4	18 5
2	17 46	17 49	17 51	17 54	17 55	17 57	17 59	18 1	18 2	18 3	18 5	18 6	18 8
3	17 46	17 49	17 51	17 54	17 56	17 58	18 0	18 3	18 4	18 5	18 7	18 8	18 10
4	17 46	17 48	17 52	17 55	17 57	17 59	18 1	18 4	18 6	18 7	18 9	18 10	18 12
5	17 45	17 48	17 52	17 56	17 58	18 0	18 3	18 6	18 7	18 9	18 11	18 12	18 15
6	17 45	17 48	17 52	17 56	17 58	18 1	18 4	18 7	18 9	18 11	18 13	18 15	18 17
7	17 45	17 48	17 52	17 57	17 59	18 2	18 5	18 9	18 11	18 13	18 15	18 17	18 19
8	17 44	17 48	17 53	17 57	18 0	18 3	18 6	18 11	18 12	18 14	18 17	18 19	18 22
9	17 44	17 48	17 53	17 58	18 1	18 4	18 8	18 12	18 14	18 16	18 19	18 21	18 24
10	17 44	17 48	17 53	17 58	18 2	18 5	18 9	18 14	18 16	18 18	18 21	18 24	18 27
11	17 44	17 48	17 54	17 59	18 2	18 6	18 10	18 15	18 18	18 20	18 23	18 26	18 29
12	17 43	17 48	17 54	18 0	18 3	18 7	18 12	18 17	18 19	18 22	18 25	18 28	18 32
13	17 43	17 48	17 54	18 0	18 4	18 8	18 13	18 18	18 21	18 24	18 27	18 30	18 34
14	17 43	17 48	17 54	18 1	18 5	18 9	18 14	18 20	18 23	18 26	18 29	18 32	18 36
15	17 43	17 49	17 55	18 2	18 6	18 10	18 16	18 22	18 24	18 28	18 31	18 35	18 39
16	17 42	17 49	17 55	18 2	18 7	18 11	18 17	18 23	18 26	18 29	18 33	18 37	18 41
17	17 42	17 49	17 56	18 3	18 8	18 12	18 18	18 25	18 28	18 31	18 35	18 39	18 44
18	17 42	17 49	17 56	18 4	18 8	18 13	18 19	18 26	18 30	18 33	18 37	18 42	18 46
19	17 42	17 49	17 56	18 4	18 9	18 14	18 21	18 28	18 31	18 35	18 39	18 44	18 49
20	17 42	17 49	17 57	18 5	18 10	18 16	18 22	18 30	18 33	18 37	18 41	18 46	18 51
21	17 41	17 49	17 57	18 6	18 11	18 17	18 23	18 31	18 35	18 39	18 43	18 48	18 54
22	17 41	17 49	17 57	18 6	18 12	18 18	18 25	18 33	18 37	18 41	18 45	18 51	18 56
23	17 41	17 49	17 58	18 7	18 13	18 19	18 26	18 35	18 38	18 43	18 48	18 53	18 59
24	17 41	17 49	17 58	18 8	18 14	18 20	18 28	18 36	18 40	18 45	18 50	18 55	19 2
25	17 41	17 50	17 59	18 9	18 14	18 21	18 29	18 38	18 42	18 47	18 52	18 58	19 4
26	17 41	17 50	17 59	18 10	18 15	18 22	18 30	18 40	18 44	18 49	18 54	19 0	19 6
27	17 41	17 50	17 59	18 10	18 16	18 23	18 32	18 41	18 46	18 51	18 56	19 2	19 9
28	17 40	17 50	18 0	18 11	18 17	18 24	18 33	18 43	18 47	18 53	18 58	19 4	19 12
29	17 40	17 50	18 0	18 12	18 18	18 26	18 34	18 44	18 49	18 55	19 0	19 7	19 14
30	17 40	17 50	18 1	18 12	18 19	18 27	18 36	18 46	18 51	18 56	19 2	19 9	19 17
31	17 40	17 50	18 1	18 13	18 20	18 28	18 37	18 48	18 53	18 58	19 5	19 12	19 19
Nov. 1	17 40	17 51	18 2	18 14	18 21	18 29	18 38	18 50	18 55	19 0	19 7	19 14	19 22
2	17 40	17 51	18 2	18 15	18 22	18 30	18 40	18 51	18 56	19 2	19 9	19 16	19 24
3	17 40	17 51	18 2	18 16	18 23	18 31	18 41	18 53	18 58	19 4	19 11	19 18	19 27
4	17 40	17 51	18 3	18 16	18 24	18 32	18 42	18 54	19 0	19 6	19 13	19 21	19 30
5	17 40	17 52	18 4	18 17	18 25	18 34	18 44	18 56	19 2	19 8	19 15	19 23	19 32
6	17 40	17 52	18 4	18 18	18 26	18 35	18 45	18 58	19 4	19 10	19 17	19 26	19 35
7	17 40	17 52	18 4	18 19	18 27	18 36	18 47	19 0	19 6	19 12	19 20	19 28	19 37
8	17 40	17 52	18 5	18 19	18 28	18 37	18 48	19 1	19 7	19 14	19 22	19 30	19 40
9	17 40	17 53	18 6	18 20	18 29	18 38	18 49	19 3	19 9	19 16	19 24	19 32	19 42
10	17 41	17 53	18 6	18 21	18 30	18 39	18 51	19 4	19 11	19 18	19 26	19 35	19 45
11	17 41	17 53	18 6	18 22	18 31	18 40	18 52	19 6	19 13	19 20	19 28	19 37	19 48
12	17 41	17 54	18 7	18 23	18 32	18 42	18 53	19 8	19 14	19 22	19 30	19 39	19 50
13	17 41	17 54	18 8	18 24	18 33	18 43	18 55	19 9	19 16	19 24	19 32	19 42	19 53
14	17 41	17 54	18 8	18 24	18 34	18 44	18 56	19 11	19 18	19 26	19 34	19 44	19 55
15	17 41	17 55	18 9	18 25	18 34	18 45	18 58	19 13	19 20	19 28	19 36	19 46	19 58
16	*17 41*	*17 55*	18 10	18 26	18 35	18 46	18 59	19 14	19 22	19 29	19 38	19 48	20 0

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 2	5 53	5 50	5 48	5 46	5 44	5 43	5 41	5 39	5 38	5 37	5 36	5 34	5 33
3	5 52	5 50	5 47	5 44	5 43	5 41	5 39	5 36	5 35	5 34	5 33	5 32	5 30
4	5 52	5 49	5 46	5 43	5 42	5 39	5 37	5 34	5 33	5 32	5 30	5 29	5 27
5	5 52	5 49	5 46	5 42	5 40	5 38	5 35	5 32	5 31	5 29	5 28	5 26	5 24
6	5 52	5 48	5 45	5 41	5 39	5 36	5 33	5 30	5 28	5 27	5 25	5 23	5 21
7	5 51	5 48	5 44	5 40	5 37	5 35	5 32	5 28	5 26	5 24	5 22	5 20	5 18
8	5 51	5 47	5 43	5 38	5 36	5 33	5 30	5 26	5 24	5 22	5 20	5 18	5 15
9	5 51	5 46	5 42	5 37	5 34	5 31	5 28	5 24	5 22	5 20	5 17	5 15	5 12
10	5 50	5 46	5 41	5 36	5 33	5 30	5 26	5 22	5 20	5 17	5 15	5 12	5 9
11	5 50	5 45	5 40	5 35	5 32	5 28	5 24	5 19	5 17	5 15	5 12	5 9	5 6
12	5 50	5 45	5 40	5 34	5 30	5 27	5 22	5 17	5 15	5 12	5 10	5 6	5 3
13	5 50	5 44	5 39	5 33	5 29	5 25	5 21	5 15	5 13	5 10	5 7	5 4	5 0
14	5 50	5 44	5 38	5 32	5 28	5 24	5 19	5 13	5 11	5 8	5 5	5 1	4 57
15	5 49	5 43	5 37	5 30	5 27	5 22	5 17	5 11	5 8	5 5	5 2	4 58	4 54
16	5 49	5 43	5 37	5 29	5 25	5 21	5 15	5 9	5 6	5 3	5 0	4 56	4 51
17	5 49	5 42	5 36	5 28	5 24	5 19	5 14	5 7	5 4	5 1	4 57	4 53	4 48
18	5 49	5 42	5 35	5 27	5 23	5 18	5 12	5 5	5 2	4 58	4 55	4 50	4 46
19	5 48	5 42	5 34	5 26	5 22	5 16	5 10	5 3	5 0	4 56	4 52	4 48	4 43
20	5 48	5 41	5 34	5 25	5 20	5 15	5 8	5 1	4 58	4 54	4 50	4 45	4 40
21	5 48	5 41	5 33	5 24	5 19	5 13	5 7	4 59	4 56	4 52	4 47	4 42	4 37
22	5 48	5 40	5 32	5 23	5 18	5 12	5 5	4 57	4 53	4 49	4 45	4 40	4 34
23	5 48	5 40	5 32	5 22	5 17	5 11	5 4	4 55	4 51	4 47	4 42	4 37	4 31
24	5 48	5 39	5 31	5 21	5 16	5 9	5 2	4 53	4 49	4 45	4 40	4 35	4 28
25	5 48	5 39	5 30	5 20	5 14	5 8	5 0	4 51	4 47	4 43	4 38	4 32	4 26
26	5 47	5 39	5 30	5 19	5 13	5 7	4 59	4 50	4 45	4 40	4 35	4 30	4 23
27	5 47	5 38	5 29	5 18	5 12	5 5	4 57	4 48	4 43	4 38	4 33	4 27	4 20
28	5 47	5 38	5 28	5 17	5 11	5 4	4 56	4 46	4 41	4 36	4 31	4 24	4 18
29	5 47	5 38	5 28	5 16	5 10	5 3	4 54	4 44	4 39	4 34	4 28	4 22	4 15
30	5 47	5 37	5 27	5 16	5 9	5 2	4 53	4 42	4 38	4 32	4 26	4 20	4 12
31	5 47	5 37	5 27	5 15	5 8	5 0	4 51	4 40	4 36	4 30	4 24	4 17	4 10
Nov. 1	5 47	5 37	5 26	5 14	5 7	4 59	4 50	4 39	4 34	4 28	4 22	4 15	4 7
2	5 47	5 37	5 26	5 13	5 6	4 58	4 48	4 37	4 32	4 26	4 20	4 12	4 4
3	5 47	5 36	5 25	5 12	5 5	4 57	4 47	4 35	4 30	4 24	4 18	4 10	4 2
4	5 47	5 36	5 25	5 12	5 4	4 56	4 46	4 34	4 28	4 22	4 15	4 8	3 59
5	5 47	5 36	5 24	5 11	5 3	4 54	4 44	4 32	4 26	4 20	4 13	4 5	3 56
6	5 47	5 36	5 24	5 10	5 2	4 53	4 43	4 30	4 25	4 18	4 11	4 3	3 54
7	5 47	5 36	5 23	5 9	5 1	4 52	4 42	4 29	4 23	4 16	4 9	4 1	3 52
8	5 47	5 35	5 23	5 9	5 0	4 51	4 40	4 27	4 21	4 15	4 7	3 59	3 49
9	5 47	5 35	5 22	5 8	5 0	4 50	4 39	4 26	4 20	4 13	4 5	3 56	3 47
10	5 48	5 35	5 22	5 7	4 59	4 49	4 38	4 24	4 18	4 11	4 3	3 54	3 44
11	5 48	5 35	5 22	5 7	4 58	4 48	4 37	4 23	4 16	4 9	4 1	3 52	3 42
12	5 48	5 35	5 21	5 6	4 57	4 47	4 36	4 21	4 15	4 8	3 59	3 50	3 40
13	5 48	5 35	5 21	5 6	4 57	4 46	4 34	4 20	4 13	4 6	3 58	3 48	3 37
14	5 48	5 35	5 21	5 5	4 56	4 46	4 33	4 19	4 12	4 4	3 56	3 46	3 35
15	5 48	5 35	5 20	5 4	4 55	4 45	4 32	4 17	4 10	4 3	3 54	3 44	3 33
16	5 48	5 35	5 20	5 4	4 55	4 44	4 31	4 16	4 9	4 1	3 52	3 42	3 31
17	5 48	5 35	5 20	5 4	4 54	4 43	4 30	4 15	4 8	4 0	3 51	3 40	3 28

TABLE VIII.

LOCAL ASTRONOMICAL MEAN TIME OF SUNRISE, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, subtract 12 hours, mark the result A. M., and add one to the day.

To obtain the standard time at any the local time by the number of is west of decrease the local time by the number of is east meridian.

720.

LOCAL ASTRONOMICAL MEAN TIME OF SUNSET, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, write P. M. after the astronomical time.

To obtain the standard time at any station, increase the local time by the number of minutes the station is west of the standard meridian, or decrease the local time by the number of minutes the station is east of the standard meridian.

For sunset in southern latitudes see page 720.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Nov. 17	5 48	5 35	5 20	5 4	4 54	4 43	4 30	4 15	4 8	4 0	3 51	3 40	3 28
18	5 49	5 35	5 20	5 3	4 53	4 42	4 29	4 14	4 6	3 58	3 49	3 38	3 26
19	5 49	5 35	5 20	5 3	4 53	4 42	4 28	4 12	4 5	3 57	3 47	3 37	3 24
20	5 49	5 35	5 20	5 2	4 52	4 41	4 28	4 11	4 4	3 55	3 46	3 35	3 22
21	5 49	5 35	5 20	5 2	4 52	4 40	4 27	4 10	4 2	3 54	3 44	3 33	3 20
22	5 50	5 35	5 19	5 2	4 51	4 40	4 26	4 9	4 1	3 53	3 43	3 32	3 19
23	5 50	5 35	5 19	5 1	4 51	4 39	4 25	4 8	4 0	3 51	3 41	3 30	3 17
24	5 50	5 35	5 19	5 1	4 50	4 39	4 24	4 7	3 59	3 50	3 40	3 28	3 15
25	5 51	5 35	5 19	5 1	4 50	4 38	4 24	4 6	3 58	3 49	3 39	3 27	3 13
26	5 51	5 35	5 19	5 1	4 50	4 38	4 23	4 6	3 57	3 48	3 38	3 26	3 12
27	5 51	5 36	5 19	5 0	4 50	4 37	4 22	4 5	3 56	3 47	3 36	3 24	3 10
28	5 51	5 36	5 19	5 0	4 49	4 37	4 22	4 4	3 55	3 46	3 35	3 23	3 8
29	5 52	5 36	5 19	5 0	4 49	4 36	4 21	4 3	3 54	3 45	3 34	3 22	3 7
30	5 52	5 36	5 19	5 0	4 49	4 36	4 21	4 2	3 54	3 44	3 33	3 20	3 5
Dec. 1	5 52	5 36	5 19	5 0	4 49	4 36	4 20	4 2	3 53	3 43	3 32	3 19	3 4
2	5 53	5 37	5 20	5 0	4 48	4 36	4 20	4 1	3 52	3 42	3 31	3 18	3 3
3	5 53	5 37	5 20	5 0	4 48	4 35	4 20	4 1	3 52	3 42	3 30	3 17	3 2
4	5 54	5 37	5 20	5 0	4 48	4 35	4 19	4 0	3 51	3 41	3 30	3 16	3 0
5	5 54	5 38	5 20	5 0	4 48	4 35	4 19	4 0	3 51	3 40	3 29	3 15	2 59
6	5 54	5 38	5 20	5 0	4 48	4 35	4 19	3 59	3 50	3 40	3 28	3 14	2 58
7	5 55	5 38	5 20	5 0	4 48	4 35	4 19	3 59	3 50	3 39	3 27	3 14	2 57
8	5 55	5 38	5 21	5 0	4 48	4 35	4 18	3 59	3 49	3 39	3 27	3 13	2 57
9	5 56	5 39	5 21	5 0	4 48	4 35	4 18	3 58	3 49	3 38	3 26	3 12	2 56
10	5 56	5 39	5 21	5 0	4 48	4 35	4 18	3 58	3 49	3 38	3 26	3 12	2 55
11	5 57	5 40	5 22	5 1	4 49	4 35	4 18	3 58	3 49	3 38	3 26	3 11	2 55
12	5 57	5 40	5 22	5 1	4 49	4 35	4 18	3 58	3 48	3 38	3 25	3 11	2 54
13	5 58	5 40	5 22	5 1	4 49	4 35	4 18	3 58	3 48	3 38	3 25	3 11	2 54
14	5 58	5 41	5 22	5 2	4 49	4 35	4 19	3 58	3 48	3 38	3 25	3 11	2 54
15	5 58	5 41	5 23	5 2	4 50	4 36	4 19	3 58	3 48	3 38	3 25	3 10	2 53
16	5 59	5 42	5 23	5 2	4 50	4 36	4 19	3 58	3 49	3 38	3 25	3 10	2 53
17	6 0	5 42	5 24	5 2	4 50	4 36	4 19	3 59	3 49	3 38	3 25	3 10	2 53
18	6 0	5 42	5 24	5 3	4 50	4 36	4 20	3 59	3 49	3 38	3 25	3 10	2 53
19	6 0	5 43	5 25	5 3	4 51	4 37	4 20	3 59	3 49	3 38	3 25	3 11	2 53
20	6 1	5 44	5 25	5 4	4 51	4 37	4 20	4 0	3 50	3 38	3 26	3 11	2 53
21	6 2	5 44	5 26	5 4	4 52	4 38	4 21	4 0	3 50	3 39	3 26	3 11	2 54
22	6 2	5 44	5 26	5 5	4 52	4 38	4 21	4 0	3 50	3 39	3 27	3 12	2 54
23	6 2	5 45	5 26	5 5	4 53	4 39	4 22	4 1	3 51	3 40	3 27	3 12	2 55
24	6 3	5 46	5 27	5 6	4 53	4 39	4 22	4 2	3 52	3 40	3 28	3 13	2 55
25	6 3	5 46	5 28	5 6	4 54	4 40	4 23	4 2	3 52	3 41	3 28	3 14	2 56
26	6 4	5 47	5 28	5 7	4 54	4 40	4 24	4 3	3 53	3 42	3 29	3 14	2 57
27	6 4	5 47	5 29	5 7	4 55	4 41	4 24	4 4	3 54	3 43	3 30	3 15	2 58
28	6 5	5 48	5 29	5 8	4 56	4 42	4 25	4 4	3 54	3 43	3 31	3 16	2 59
29	6 6	5 48	5 30	5 9	4 56	4 42	4 26	4 5	3 55	3 44	3 32	3 17	3 0
30	6 6	5 49	5 30	5 9	4 57	4 43	4 26	4 6	3 56	3 45	3 33	3 18	3 1
31	6 6	5 49	5 31	5 10	4 58	4 44	4 27	4 7	3 57	3 46	3 34	3 19	3 2
32	6 7	5 50	5 32	5 11	4 59	4 45	4 28	4 8	3 58	3 47	3 35	3 21	3 4

SUNRISE AND SUNSET FOR SOUTHERN LATITUDES, 1919.

In the case of a southern latitude the time of sunrise or sunset is taken from Table VIII, with the corresponding northern latitude, not for the given date but for a date about six months earlier or later, which is to be found in the following table. The time taken from Table VIII, whether of sunrise or of sunset, must be corrected by the quantity given in Table IX on the same line with the given date.

Example.—May 10, 1919, civil date, in latitude −38°, required the time of sunrise and sunset.

The astronomical date is May 9 for sunrise and May 10 for sunset; Table IX gives November 11 and 12 as the corresponding dates, northern latitude, while the correction is $+12^m$ in each case.

	Sunrise.	Sunset.
	d h m	d h m
Table VIII, Lat. +38°	Nov. 11 18 36	Nov. 12 4 51
Table IX	May 9 + 12	May 10 + 12
Local astronomical mean time . .	May 9 18 48	May 10 5 3
Civil time	May 10 6 48 A. M	May 10 5 3 P.M.

Given Date.	Corresponding Date, Northern Latitude.	Correction.	Given Date.	Corresponding Date, Northern Latitude.	Correction.	Given Date.	Corresponding Date, Northern Latitude.	Correction.	Given Date.	Corresponding Date, Northern Latitude.	Correction.
		m			m			m			m
Jan. 0	July 2	−1	Feb. 5	Aug. 9	+ 9	Mar. 13	Sept. 15	+14	Apr. 18	Oct. 21	+15
1	3	0	6	10	9	14	16	14	19	22	15
2	4	0	7	11	9	15	17	14	20	23	14
3	5	0	8	12	9	16	18	15	21	24	14
4	6	0	9	13	10	17	19	15	22	25	14
5	7	+1	10	14	+10	18	20	+15	23	26	+14
6	8	1	11	15	10	19	21	15	24	27	14
7	9	1	12	16	10	20	22	15	25	28	14
8	10	2	13	17	10	21	23	15	26	29	14
9	11	2	14	18	11	22	24	15	27	30	14
10	12	+2	15	19	+11	23	25	+15	28	31	+14
11	13	2	16	20	11	24	26	15	29	Nov. 1	14
12	14	3	17	21	11	25	27	15	30	2	14
13	15	3	18	23	11	26	28	15	May 1	3	13
14	16	3	19	24	12	27	29	15	2	4	13
15	18	+4	20	25	+12	28	30	+15	3	5	+13
16	19	4	21	26	12	29	Oct. 2	15	4	6	13
17	20	4	22	27	12	30	3	16	5	7	13
18	21	4	23	28	12	31	4	16	6	8	13
19	22	5	24	29	12	Apr. 1	5	16	7	9	13
20	23	+5	25	30	+13	2	6	+16	8	10	+12
21	24	5	26	31	13	3	7	16	9	11	12
22	25	5	27	Sept. 1	13	4	8	15	10	12	12
23	26	6	28	2	13	5	9	15	11	13	12
24	27	6	Mar. 1	3	13	6	10	15	12	14	12
25	28	+6	2	4	+13	7	10	+15	13	15	+12
26	29	6	3	5	13	8	11	15	14	16	11
27	30	7	4	6	13	9	12	15	15	16	11
28	31	7	5	7	14	10	13	15	16	17	11
29	Aug. 1	7	6	8	14	11	14	15	17	18	11
30	2	+7	7	9	+14	12	15	+15	18	19	+11
31	4	8	8	10	14	13	16	15	19	20	11
Feb. 1	5	8	9	11	14	14	17	15	20	21	10
2	6	8	10	12	14	15	18	15	21	22	10
3	7	8	11	13	14	16	19	15	22	23	10
4	8	+9	12	14	+14	17	20	+15	23	24	+ 10

TABLE IX.

SUNRISE AND SUNSET FOR SOUTHERN LATITUDES, 1919.

Given Date.	Corresponding Date, Northern Latitude.	Correction.	Given Date.	Corresponding Date, Northern Latitude.	Correction.	Given Date.	Corresponding Date, Northern Latitude.	Correction.	Given Date.	Corresponding Date, Northern Latitude.	Correction.
		m			m			m			m
ay 24	Nov. 25	+10	July 19	Jan. 16	− 4	Sept. 13	Mar. 11	−14	Nov. 8	May 6	−13
25	26	9	20	17	4	14	12	14	9	7	13
26	27	9	21	18	4	15	13	14	10	8	12
27	28	9	22	19	5	16	14	14	11	9	12
28	29	9	23	20	5	17	15	14	12	10	12
29	30	+ 8	24	21	− 5	18	16	−15	13	11	−12
30	Dec. 1	8	25	22	5	19	17	15	14	12	12
31	2	8	26	23	6	20	18	15	15	13	12
ıne 1	3	8	27	24	6	21	19	15	16	15	11
2	4	8	28	25	6	22	20	15	17	16	11
3	5	+ 7	29	26	− 6	23	21	−15	18	17	−11
4	5	7	30	27	7	24	22	15	19	18	11
5	6	7	31	28	7	25	23	15	20	19	11
6	7	7	Aug. 1	29	7	26	24	15	21	20	10
7	8	7	2	30	7	27	25	15	22	21	10
8	9	+ 6	3	30	− 7	28	26	−15	23	22	−10
9	10	6	4	31	8	29	27	15	24	23	10
10	11	6	5	Feb. 1	8	30	28	15	25	24	10
11	12	6	6	2	8	Oct. 1	29	15	26	25	9
12	13	5	7	3	8	2	29	15	27	26	9
13	14	+ 5	8	4	− 9	3	30	−16	28	27	− 9
14	15	5	9	5	9	4	31	16	29	28	9
15	16	4	10	6	9	5	Apr. 1	16	30	29	8
16	17	4	11	7	9	6	2	16	Dec. 1	30	8
17	18	4	12	8	9	7	3	16	2	31	8
18	19	+ 4	13	9	−10	8	4	−15	3	June 1	− 8
19	20	4	14	10	10	9	5	15	4	2	8
20	20	4	15	11	10	10	7	15	5	4	7
21	21	3	16	12	10	11	8	15	6	5	7
22	22	3	17	13	10	12	9	15	7	6	7
23	23	+ 3	18	14	−11	13	10	−15	8	7	− 7
24	24	2	19	15	11	14	11	15	9	8	6
25	25	2	20	16	11	15	12	15	10	9	6
26	26	2	21	17	11	16	13	15	11	10	6
27	27	2	22	18	11	17	14	15	12	11	6
28	28	+ 1	23	18	−11	18	15	−15	13	12	− 5
29	29	1	24	19	12	19	16	15	14	13	5
30	30	1	25	20	12	20	17	15	15	14	5
ıly 1	Dec. 31	1	26	21	12	21	18	15	16	15	4
2	Jan. 0	+ 1	27	22	12	22	19	15	17	16	4
3	1	0	28	23	−12	23	20	−14	18	17	− 4
4	2	0	29	24	12	24	21	14	19	18	4
5	3	0	30	25	13	25	22	14	20	19	4
6	4	0	31	26	13	26	23	14	21	21	3
7	5	− 1	Sept. 1	27	13	27	24	14	22	22	3
8	6	− 1	2	28	−13	28	25	−14	23	23	− 3
9	7	1	3	Mar. 1	13	29	26	14	24	24	2
10	8	2	4	2	13	30	27	14	25	25	2
11	9	2	5	3	13	31	28	14	26	26	2
12	10	2	6	4	13	Nov. 1	29	14	27	27	2
13	11	− 2	7	5	−14	2	30	−14	28	28	− 1
14	12	3	8	6	14	3	May 1	13	29	29	1
15	13	3	9	7	14	4	2	13	30	30	1
16	14	3	10	8	14	5	3	13	31	July 1	− 1
17	15	4	11	9	14	6	4	13	32	2	0
18	15	− 4	12	10	−14	7	5	−13			

LOCAL ASTRONOMICAL MEAN TIME OF MOONSET, MERIDIAN OF GREENWICH, 1919.

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Date. \ Lat.		0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	1	5 31	5 14	4 56	4 36	4 24	4 10	3 53	3 33	3 23	3 12	3 0	2 45	2 28
	2	6 24	6 8	5 52	5 34	5 23	5 11	4 56	4 38	4 30	4 20	4 10	3 57	3 43
	3	7 15	7 3	6 50	6 34	6 25	6 15	6 3	5 49	5 42	5 34	5 26	5 16	5 5
	4	8 6	7 57	7 47	7 36	7 29	7 22	7 13	7 2	6 58	6 52	6 46	6 39	6 32
	5	8 56	8 50	8 44	8 38	8 34	8 29	8 24	8 18	8 15	8 12	8 8	8 4	8 0
	6	9 45	9 43	9 42	9 40	9 38	9 37	9 36	9 34	9 33	9 32	9 31	9 30	9 29
	7	10 34	10 36	10 39	10 42	10 44	10 46	10 48	10 50	10 52	10 53	10 55	10 56	10 58
	8	11 24	11 31	11 38	11 45	11 50	11 55	12 1	12 8	12 11	12 15	12 19	12 23	12 28
	9	12 16	12 27	12 38	12 50	12 57	13 5	13 14	13 26	13 32	13 38	13 44	13 52	14 0
	10	13 11	13 24	13 39	13 55	14 5	14 16	14 29	14 44	14 52	15 0	15 9	15 20	15 32
	11	14 8	14 24	14 41	15 1	15 12	15 25	15 41	16 0	16 9	16 19	16 30	16 44	16 59
	12	15 7	15 24	15 43	16 4	16 16	16 31	16 48	17 8	17 18	17 30	17 42	17 57	18 15
	13	16 7	16 24	16 42	17 3	17 16	17 30	17 47	18 7	18 17	18 28	18 41	18 55	19 12
	14	17 5	17 21	17 38	17 57	18 9	18 22	18 37	18 56	19 4	19 14	19 25	19 38	19 53
	15	18 0	18 14	18 28	18 45	18 55	19 6	19 18	19 34	19 41	19 49	19 58	20 8	20 20
	16	18 52	19 3	19 14	19 27	19 34	19 43	19 53	20 4	20 10	20 16	20 22	20 29	20 38
	17	19 41	19 48	19 56	20 5	20 10	20 15	20 22	20 30	20 33	20 37	20 41	20 46	20 52
	18	20 27	20 31	20 34	20 39	20 42	20 44	20 48	20 51	20 53	20 55	20 57	21 0	21 2
	19	21 11	21 11	21 11	21 11	21 11	21 11	21 12	21 12	21 12	21 12	21 12	21 12	21 12
	20	21 53	21 50	21 47	21 43	21 40	21 38	21 35	21 31	21 30	21 28	21 26	21 24	21 21
	21	22 36	22 29	22 22	22 14	22 10	22 4	21 58	21 51	21 48	21 44	21 40	21 36	21 31
	22	23 19	23 9	22 59	22 47	22 40	22 33	22 24	22 13	22 8	22 3	21 57	21 50	21 42
	23	....	23 51	23 38	23 22	23 14	23 4	22 52	22 38	22 31	22 24	22 16	22 7	21 56
	24	0 3	....	....	....	23 50	23 38	23 24	23 7	22 59	22 50	22 40	22 29	22 15
	25	0 49	0 35	0 19	0 1	....	....	....	23 43	23 34	23 23	23 11	22 58	22 42
	26	1 37	1 21	1 4	0 43	0 32	0 18	0 2	....	....	....	23 52	23 38	23 20
	27	2 28	2 10	1 52	1 31	1 18	1 4	0 47	0 26	0 16	0 5	....	....	....
	28	3 20	3 2	2 44	2 23	2 11	1 57	1 40	1 19	1 9	0 58	0 46	0 31	0 13
	29	4 12	3 56	3 40	3 20	3 9	2 56	2 40	2 21	2 12	2 2	1 50	1 36	1 21
	30	5 5	4 52	4 37	4 20	4 10	3 59	3 46	3 29	3 22	3 13	3 4	2 53	2 40
	31	5 57	5 47	5 35	5 22	5 15	5 6	4 56	4 44	4 38	4 31	4 24	4 16	4 7
Feb.	1	6 49	6 42	6 34	6 25	6 20	6 15	6 8	6 0	5 56	5 54	5 48	5 42	5 36
	2	7 39	7 36	7 33	7 29	7 27	7 24	7 21	7 18	7 16	7 15	7 12	7 10	7 8
	3	8 30	8 31	8 32	8 33	8 34	8 35	8 35	8 36	8 37	8 37	8 38	8 39	8 39
	4	9 21	9 26	9 32	9 38	9 41	9 45	9 50	9 55	9 58	10 1	10 4	10 8	10 11
	5	10 14	10 22	10 32	10 43	10 49	10 56	11 4	11 14	11 19	11 25	11 30	11 37	11 44
	6	11 7	11 20	11 33	11 48	11 57	12 7	12 19	12 33	12 40	12 47	12 56	13 5	13 16
	7	12 4	12 19	12 35	12 53	13 4	13 16	13 31	13 49	13 58	14 7	14 18	14 30	14 44
	8	13 1	13 18	13 36	13 56	14 8	14 22	14 39	14 59	15 9	15 19	15 32	15 46	16 3
	9	13 59	14 16	14 35	14 56	15 8	15 22	15 39	16 0	16 10	16 21	16 34	16 48	17 5
	10	14 56	15 13	15 30	15 50	16 2	16 15	16 31	16 51	17 0	17 10	17 22	17 35	17 51
	11	15 51	16 6	16 21	16 39	16 49	17 1	17 15	17 32	17 39	17 48	17 58	18 9	18 22
	12	16 44	16 56	17 8	17 22	17 31	17 40	17 51	18 4	18 11	18 17	18 25	18 33	18 43
	13	17 33	17 42	17 51	18 1	18 7	18 14	18 22	18 32	18 36	18 41	18 46	18 52	18 59
	14	18 20	18 25	18 30	18 37	18 41	18 45	18 49	18 55	18 58	19 0	19 4	19 7	19 11
	15	19 4	19 6	19 8	19 10	19 12	19 13	19 14	19 16	19 17	19 18	19 19	19 20	19 21
	16	19 48	19 46	19 44	19 42	19 41	19 39	19 38	19 36	19 35	19 34	19 33	19 32	19 31
	17	20 30	20 25	20 20	20 14	20 10	20 6	20 2	19 56	19 54	19 51	19 48	19 44	19 4[illegible]

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE, MERIDIAN OF GREENWICH, 1919.

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Feb. 16	7 27	7 27	7 27	7 27	7 27	7 27	7 27	7 27	7 27	7 27	7 27	7 27	7 27
17	8 10	8 13	8 17	8 21	8 24	8 26	8 30	8 33	8 35	8 37	8 39	8 42	8 44
18	8 52	8 59	9 6	9 15	9 20	9 25	9 31	9 39	9 43	9 46	9 51	9 56	10 1
19	9 36	9 46	9 56	10 8	10 15	10 23	10 32	10 44	10 49	10 55	11 1	11 9	11 17
20	10 20	10 33	10 46	11 2	11 10	11 21	11 33	11 48	11 54	12 2	12 11	12 20	12 32
21	11 6	11 21	11 37	11 55	12 6	12 18	12 32	12 50	12 58	13 8	13 18	13 30	13 44
22	11 54	12 10	12 28	12 48	13 0	13 13	13 29	13 49	13 58	14 9	14 21	14 35	14 51
23	12 44	13 1	13 19	13 40	13 52	14 6	14 23	14 44	14 54	15 5	15 17	15 32	15 50
24	13 35	13 51	14 9	14 30	14 42	14 56	15 12	15 33	15 42	15 53	16 5	16 19	16 36
25	14 27	14 42	14 59	15 18	15 29	15 42	15 56	16 15	16 23	16 33	16 44	16 56	17 11
26	15 19	15 32	15 46	16 2	16 12	16 23	16 36	16 51	16 58	17 6	17 15	17 25	17 36
27	16 11	16 20	16 32	16 45	16 52	17 1	17 11	17 22	17 28	17 34	17 40	17 47	17 56
28	17 3	17 10	17 17	17 25	17 30	17 36	17 42	17 49	17 53	17 56	18 1	18 5	18 11
Mar. 1	17 54	17 58	18 1	18 4	18 6	18 9	18 12	18 15	18 16	18 18	18 19	18 22	18 24
2	18 47	18 46	18 44	18 43	18 42	18 41	18 40	18 39	18 39	18 38	18 38	18 37	18 36
3	19 40	19 34	19 29	19 22	19 19	19 15	19 10	19 5	19 2	18 59	18 56	18 53	18 49
4	20 34	20 25	20 15	20 4	19 58	19 51	19 42	19 32	19 28	19 23	19 18	19 11	19 4
5	21 30	21 18	21 5	20 49	20 40	20 30	20 19	20 5	19 58	19 51	19 43	19 34	19 24
6	22 28	22 13	21 57	21 38	21 28	21 15	21 1	20 43	20 35	20 26	20 16	20 4	19 51
7	23 27	23 10	22 52	22 32	22 20	22 6	21 50	21 30	21 21	21 10	20 58	20 45	20 28
8	....	....	23 50	23 29	23 17	23 3	22 46	22 26	22 16	22 5	21 53	21 39	21 22
9	0 25	0 8	....	....	....	....	23 48	23 29	23 20	23 10	22 59	22 45	22 30
10	1 21	1 5	0 48	0 28	0 17	0 4	....	....	....	....	....	....	23 47
11	2 15	2 1	1 46	1 29	1 19	1 7	0 54	0 37	0 30	0 21	0 11	0 0	....
12	3 6	2 54	2 42	2 28	2 20	2 11	2 0	1 47	1 41	1 34	1 27	1 18	1 9
13	3 53	3 45	3 36	3 27	3 21	3 14	3 7	2 57	2 53	2 49	2 43	2 37	2 31
14	4 39	4 34	4 29	4 23	4 20	4 16	4 12	4 6	4 4	4 1	3 58	3 55	3 51
15	5 23	5 22	5 20	5 18	5 18	5 16	5 16	5 14	5 13	5 13	5 12	5 11	5 10
16	6 6	6 8	6 10	6 13	6 14	6 16	6 18	6 20	6 22	6 23	6 24	6 26	6 27
17	6 48	6 54	7 0	7 6	7 10	7 15	7 20	7 26	7 29	7 32	7 35	7 39	7 44
18	7 32	7 40	7 49	8 0	8 6	8 13	8 21	8 31	8 35	8 40	8 46	8 52	8 59
19	8 16	8 27	8 40	8 53	9 2	9 11	9 22	9 35	9 41	9 48	9 56	10 4	10 14
20	9 1	9 15	9 30	9 47	9 57	10 8	10 21	10 38	10 45	10 54	11 4	11 15	11 27
21	9 48	10 4	10 20	10 40	10 51	11 4	11 19	11 38	11 46	11 56	12 8	12 21	12 36
22	10 36	10 53	11 11	11 31	11 43	11 57	12 13	12 34	12 43	12 54	13 6	13 20	13 37
23	11 26	11 43	12 1	12 21	12 33	12 47	13 4	13 24	13 34	13 44	13 56	14 11	14 27
24	12 16	12 32	12 49	13 9	13 20	13 34	13 49	14 8	14 17	14 27	14 38	14 51	15 6
25	13 7	13 21	13 38	13 54	14 4	14 16	14 29	14 46	14 53	15 2	15 12	15 22	15 35
26	13 58	14 10	14 22	14 36	14 45	14 54	15 5	15 18	15 24	15 31	15 39	15 47	15 57
27	14 49	14 57	15 6	15 17	15 23	15 30	15 37	15 47	15 51	15 56	16 1	16 7	16 14
28	15 40	15 44	15 50	15 56	15 59	16 3	16 8	16 13	16 15	16 18	16 21	16 24	16 28
29	16 31	16 32	16 33	16 34	16 35	16 36	16 37	16 38	16 38	16 39	16 40	16 40	16 41
30	17 24	17 21	17 18	17 14	17 12	17 9	17 7	17 3	17 2	17 0	16 58	16 56	16 54
31	18 19	18 12	18 4	17 56	17 51	17 45	17 39	17 31	17 27	17 23	17 19	17 15	17 9
Apr. 1	*19 16*	19 5	18 54	18 41	18 33	18 24	18 14	18 2	17 57	17 50	17 44	17 36	17 28
2	*20 16*	20 2	19 47	19 30	19 20	19 8	18 55	18 39	18 32	18 24	18 14	18 4	17 52
3	*21 16*	21 0	20 43	20 24	20 12	19 59	19 44	19 25	19 16	19 6	18 55	18 42	18 27

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Feb. 16	19 48	19 46	19 44	19 42	19 41	19 39	19 38	19 36	19 35	19 34	19 33	19 32	19 31
17	20 30	20 25	20 20	20 14	20 10	20 6	20 2	19 56	19 54	19 51	19 48	19 44	19 41
18	21 13	21 5	20 56	20 46	20 41	20 34	20 26	20 17	20 13	20 8	20 3	19 58	19 52
19	21 57	21 46	21 34	21 21	21 13	21 4	20 54	20 41	20 35	20 29	20 22	20 14	20 5
20	22 42	22 29	22 14	21 58	21 48	21 37	21 24	21 8	21 1	20 53	20 44	20 34	20 22
21	23 29	23 14	22 57	22 38	22 27	22 14	21 59	21 41	21 32	21 23	21 12	20 59	20 45
22	....	....	23 43	23 23	23 11	22 57	22 40	22 20	22 11	22 0	21 48	21 34	21 17
23	0 18	0 1	....	....	....	23 46	23 29	23 8	22 58	22 47	22 34	22 20	22 2
24	1 8	0 51	0 33	0 12	0 0	....	....	....	23 55	23 44	23 32	23 18	23 2
25	2 0	1 43	1 26	1 6	0 54	0 40	0 24	0 4	....	....	....	....	....
26	2 52	2 37	2 21	2 3	1 53	1 41	1 26	1 9	1 0	0 51	0 40	0 29	0 15
27	3 44	3 32	3 19	3 4	2 55	2 45	2 34	2 20	2 13	2 6	1 57	1 48	1 37
28	4 36	4 27	4 17	4 7	4 0	3 53	3 45	3 34	3 30	3 24	3 19	3 12	3 5
Mar. 1	5 27	5 22	5 17	5 11	5 7	5 3	4 58	4 53	4 50	4 47	4 44	4 40	4 36
2	6 19	6 18	6 17	6 16	6 15	6 14	6 13	6 12	6 12	6 11	6 10	6 10	6 9
3	7 12	7 15	7 18	7 22	7 24	7 27	7 30	7 33	7 35	7 37	7 39	7 41	7 43
4	8 5	8 12	8 20	8 29	8 34	8 40	8 47	8 55	8 59	9 3	9 8	9 13	9 19
5	9 1	9 12	9 24	9 37	9 45	9 54	10 4	10 17	10 23	10 29	10 37	10 45	10 54
6	9 58	10 12	10 27	10 44	10 54	11 6	11 19	11 36	11 44	11 53	12 2	12 14	12 27
7	10 56	11 12	11 29	11 49	12 1	12 14	12 30	12 49	12 58	13 9	13 20	13 34	13 50
8	11 53	12 12	12 30	12 51	13 3	13 17	13 33	13 54	14 4	14 15	14 27	14 42	14 58
9	12 52	13 8	13 26	13 47	13 58	14 12	14 28	14 48	14 57	15 8	15 20	15 33	15 49
10	13 47	14 2	14 18	14 36	14 47	14 59	15 14	15 31	15 39	15 48	15 58	16 10	16 24
11	14 40	14 52	15 6	15 21	15 30	15 40	15 52	16 6	16 13	16 20	16 28	16 37	16 48
12	15 29	15 39	15 49	16 1	16 8	16 15	16 24	16 35	16 40	16 45	16 51	16 58	17 5
13	16 16	16 22	16 29	16 37	16 41	16 46	16 52	16 59	17 2	17 6	17 10	17 14	17 19
14	17 0	17 4	17 7	17 10	17 12	17 15	17 18	17 21	17 22	17 24	17 25	17 27	17 30
15	17 44	17 43	17 43	17 43	17 42	17 42	17 42	17 41	17 41	17 41	17 40	17 40	17 40
16	18 27	18 23	18 19	18 14	18 12	18 9	18 6	18 1	18 0	17 57	17 55	17 53	17 50
17	19 10	19 3	18 55	18 47	18 42	18 36	18 30	18 22	18 19	18 15	18 11	18 6	18 1
18	19 53	19 43	19 32	19 20	19 13	19 6	18 56	18 45	18 40	18 34	18 28	18 21	18 14
19	20 38	20 25	20 12	19 57	19 48	19 38	19 26	19 12	19 5	18 57	18 49	18 40	18 29
20	21 24	21 9	20 54	20 36	20 25	20 13	19 59	19 42	19 34	19 25	19 15	19 4	18 50
21	22 12	21 55	21 38	21 18	21 7	20 53	20 38	20 19	20 9	19 59	19 47	19 34	19 19
22	23 0	22 44	22 26	22 5	21 53	21 39	21 22	21 2	20 52	20 42	20 29	20 15	19 58
23	23 50	23 34	23 16	22 56	22 44	22 30	22 14	21 54	21 44	21 34	21 21	21 7	20 51
24	....	....	....	23 50	23 39	23 27	23 12	22 53	22 44	22 35	22 24	22 11	21 56
25	0 41	0 26	0 9	....	....	....	....	23 59	23 52	23 44	23 34	23 24	23 12
26	1 32	1 18	1 4	0 48	0 38	0 28	0 15	....	....	....	....	....	....
27	2 22	2 12	2 0	1 48	1 41	1 32	1 22	1 10	1 5	0 58	0 51	0 44	0 35
28	3 13	3 6	2 59	2 50	2 45	2 40	2 33	2 25	2 22	2 18	2 13	2 8	2 2
29	4 4	4 1	3 58	3 54	3 52	3 49	3 47	3 43	3 42	3 40	3 38	3 36	3 33
30	4 56	4 57	4 58	5 0	5 1	5 1	5 2	5 3	5 4	5 4	5 5	5 6	5 6
31	5 50	5 55	6 1	6 7	6 11	6 15	6 20	6 26	6 28	6 32	6 34	6 38	6 42
Apr. 1	6 46	6 55	7 5	7 16	7 23	7 30	7 39	7 50	7 54	8 0	8 6	8 12	8 20
2	7 44	7 57	8 10	8 26	8 35	8 45	8 58	9 12	9 19	9 27	9 36	9 48	9 57
3	8 44	9 0	9 16	9 35	9 46	9 58	10 13	10 31	10 40	10 50	11 1	11 18	11 [illegible]

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr. 1	6 46	6 55	7 5	7 16	7 23	7 30	7 39	7 50	7 54	8 0	8 6	8 12	8 20
2	7 44	7 57	8 10	8 26	8 35	8 45	8 58	9 12	9 19	9 27	9 36	9 46	9 57
3	8 44	9 0	9 16	9 35	9 46	9 58	10 13	10 31	10 40	10 50	11 1	11 13	11 28
4	9 45	10 2	10 20	10 40	10 52	11 6	11 22	11 42	11 52	12 2	12 14	12 28	12 45
5	10 45	11 2	11 19	11 40	11 52	12 5	12 22	12 42	12 51	13 2	13 14	13 27	13 43
6	11 42	11 57	12 14	12 33	12 44	12 57	13 11	13 29	13 38	13 47	13 58	14 10	14 24
7	12 36	12 50	13 4	13 20	13 29	13 40	13 52	14 7	14 14	14 22	14 31	14 41	14 52
8	13 27	13 37	13 48	14 1	14 8	14 17	14 26	14 38	14 43	14 49	14 56	15 3	15 11
9	14 14	14 21	14 29	14 38	14 43	14 49	14 56	15 4	15 7	15 11	15 16	15 21	15 26
10	14 59	15 3	15 7	15 12	15 15	15 18	15 22	15 26	15 28	15 30	15 32	15 35	15 38
11	15 42	15 43	15 44	15 44	15 45	15 45	15 46	15 47	15 47	15 47	15 48	15 48	15 48
12	16 25	16 22	16 19	16 16	16 14	16 12	16 10	16 7	16 5	16 4	16 2	16 1	15 58
13	17 7	17 2	16 55	16 48	16 44	16 39	16 34	16 28	16 24	16 21	16 18	16 14	16 9
14	17 51	17 42	17 32	17 21	17 15	17 8	17 0	16 50	16 45	16 40	16 35	16 28	16 22
15	18 35	18 23	18 11	17 56	17 48	17 39	17 28	17 15	17 9	17 2	16 54	16 46	16 36
16	19 20	19 7	18 52	18 35	18 25	18 13	18 0	17 44	17 37	17 28	17 19	17 8	16 56
17	20 7	19 52	19 35	19 16	19 5	18 52	18 37	18 19	18 10	18 0	17 49	17 37	17 22
18	20 56	20 39	20 22	20 2	19 50	19 36	19 20	19 0	18 50	18 40	18 28	18 14	17 58
19	21 45	21 29	21 11	20 51	20 39	20 25	20 9	19 49	19 39	19 28	19 16	19 2	18 46
20	22 35	22 19	22 2	21 43	21 32	21 19	21 3	20 45	20 36	20 26	20 14	20 1	19 46
21	23 24	23 10	22 55	22 38	22 28	22 17	22 3	21 47	21 39	21 30	21 20	21 9	20 56
22	....	....	23 50	23 36	23 27	23 18	23 7	22 54	22 47	22 41	22 33	22 24	22 14
23	0 13	0 2	....	....	....	....	....	....	....	23 55	23 50	23 44	23 37
24	1 2	0 54	0 45	0 35	0 29	0 22	0 14	0 5	0 0	....	....	....	....
25	1 52	1 47	1 42	1 36	1 32	1 28	1 24	1 19	1 16	1 13	1 10	1 7	1 3
26	2 42	2 41	2 40	2 39	2 38	2 37	2 36	2 35	2 34	2 34	2 33	2 32	2 32
27	3 33	3 36	3 40	3 44	3 46	3 48	3 51	3 54	3 56	3 58	4 0	4 2	4 4
28	4 28	4 34	4 42	4 51	4 56	5 2	5 8	5 17	5 20	5 25	5 29	5 34	5 40
29	5 25	5 36	5 48	6 1	6 8	6 18	6 28	6 40	6 46	6 53	7 0	7 8	7 18
30	6 25	6 39	6 54	7 11	7 21	7 33	7 46	8 3	8 11	8 20	8 29	8 40	8 54
May 1	7 27	7 43	8 1	8 20	8 32	8 45	9 1	9 20	9 29	9 40	9 51	10 4	10 20
2	8 30	8 46	9 4	9 25	9 37	9 51	10 7	10 27	10 37	10 47	10 59	11 13	11 30
3	9 31	9 47	10 4	10 23	10 35	10 48	11 3	11 22	11 31	11 40	11 52	12 4	12 19
4	10 28	10 42	10 57	11 14	11 24	11 36	11 49	12 5	12 12	12 21	12 30	12 41	12 53
5	11 23	11 33	11 45	11 59	12 7	12 16	12 26	12 39	12 45	12 52	12 59	13 7	13 16
6	12 11	12 19	12 28	12 38	12 44	12 50	12 58	13 7	13 11	13 16	13 21	13 26	13 32
7	12 57	13 2	13 8	13 14	13 17	13 21	13 26	13 31	13 33	13 36	13 39	13 42	13 46
8	13 41	13 43	13 45	13 47	13 48	13 49	13 50	13 52	13 53	13 53	13 54	13 56	13 57
9	14 24	14 22	14 20	14 18	14 17	14 16	14 14	14 12	14 12	14 11	14 10	14 8	14 7
10	15 7	15 1	14 56	14 50	14 47	14 43	14 38	14 33	14 30	14 28	14 25	14 22	14 18
11	15 49	15 41	15 32	15 23	15 17	15 11	15 3	14 55	14 51	14 46	14 41	14 36	14 30
12	16 33	16 22	16 10	15 57	15 50	15 41	15 31	15 19	15 13	15 7	15 0	14 52	14 44
13	17 18	17 5	16 50	16 34	16 25	16 14	16 2	15 46	15 39	15 32	15 23	15 13	15 1
14	18 5	17 50	17 33	17 15	17 4	16 51	16 37	16 19	16 11	16 2	15 51	15 39	15 25
15	18 53	18 36	18 19	17 59	17 48	17 34	17 18	16 59	16 49	16 39	16 27	16 14	15 58
16	19 42	19 25	19 8	18 47	18 35	18 22	18 5	17 45	17 36	17 25	17 12	16 58	16 4[illegible]
17	20 31	20 15	19 58	19 39	19 27	19 14	18 58	18 39	18 30	18 20	18 8	17 54	17 [illegible]

LOCAL ASTRONOMICAL MEAN TIME OF MOONSET, MERIDIAN OF GREENWICH, 1919.

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
May 17	20 31	20 15	19 58	19 39	19 27	19 14	18 58	18 39	18 30	18 20	18 8	17 54	17 39
18	21 21	21 6	20 51	20 33	20 22	20 10	19 56	19 39	19 31	19 22	19 11	19 0	18 46
19	22 10	21 57	21 44	21 29	21 20	21 10	20 58	20 44	20 37	20 30	20 21	20 12	20 1
20	22 58	22 48	22 38	22 27	22 20	22 12	22 3	21 52	21 47	21 42	21 36	21 28	21 21
21	23 45	23 39	23 33	23 25	23 21	23 16	23 10	23 3	23 0	22 56	22 52	22 48	22 43
22	....	....	....	....	....	....	....	....	....	....	....	....	....
23	0 33	0 31	0 28	0 25	0 23	0 21	0 19	0 16	0 15	0 14	0 12	0 10	0 8
24	1 22	1 24	1 26	1 27	1 28	1 29	1 30	1 32	1 32	1 33	1 34	1 35	1 36
25	2 14	2 19	2 24	2 31	2 35	2 39	2 44	2 50	2 52	2 56	2 59	3 2	3 6
26	3 8	3 17	3 27	3 38	3 44	3 51	4 0	4 10	4 15	4 20	4 26	4 33	4 41
27	4 5	4 18	4 31	4 47	4 56	5 6	5 18	5 32	5 39	5 47	5 56	6 5	6 16
28	5 6	5 21	5 36	5 56	6 7	6 19	6 34	6 52	7 1	7 10	7 21	7 34	7 48
29	6 9	6 26	6 43	7 4	7 16	7 29	7 45	8 5	8 15	8 25	8 37	8 51	9 8
30	7 12	7 29	7 46	8 6	8 18	8 32	8 48	9 7	9 17	9 27	9 39	9 52	10 8
31	8 13	8 28	8 44	9 2	9 13	9 25	9 40	9 57	10 6	10 14	10 25	10 37	10 50
June 1	9 10	9 22	9 36	9 51	10 0	10 10	10 22	10 37	10 43	10 50	10 59	11 8	11 18
2	10 3	10 12	10 23	10 34	10 41	10 49	10 57	11 8	11 13	11 18	11 24	11 31	11 38
3	10 52	10 58	11 5	11 12	11 17	11 22	11 27	11 34	11 37	11 41	11 45	11 49	11 53
4	11 38	11 40	11 44	11 47	11 49	11 51	11 54	11 57	11 58	12 0	12 2	12 4	12 6
5	12 22	12 21	12 20	12 20	12 19	12 19	12 18	12 18	12 17	12 17	12 16	12 16	12 16
6	13 4	13 0	12 56	12 52	12 49	12 46	12 42	12 38	12 36	12 34	12 32	12 29	12 26
7	13 47	13 40	13 33	13 24	13 19	13 14	13 7	13 0	12 56	12 52	12 48	12 43	12 38
8	14 30	14 20	14 10	13 58	13 51	13 43	13 34	13 22	13 17	13 12	13 6	12 59	12 51
9	15 15	15 2	14 49	14 34	14 25	14 15	14 3	13 49	13 42	13 35	13 27	13 18	13 7
10	16 1	15 47	15 31	15 13	15 3	14 51	14 37	14 20	14 12	14 3	13 53	13 42	13 29
11	16 49	16 33	16 16	15 56	15 45	15 32	15 16	14 57	14 48	14 38	14 27	14 14	13 58
12	17 38	17 22	17 4	16 44	16 31	16 18	16 1	15 41	15 32	15 21	15 9	14 55	14 38
13	18 28	18 12	17 54	17 34	17 22	17 9	16 53	16 33	16 24	16 13	16 1	15 47	15 31
14	19 18	19 3	18 47	18 28	18 17	18 5	17 50	17 32	17 23	17 14	17 3	16 50	16 36
15	20 7	19 54	19 40	19 24	19 15	19 4	18 51	18 36	18 29	18 21	18 12	18 1	17 49
16	20 56	20 45	20 34	20 21	20 14	20 6	19 56	19 44	19 38	19 32	19 25	19 17	19 8
17	21 43	21 36	21 28	21 20	21 14	21 9	21 2	20 54	20 50	20 46	20 41	20 36	20 30
18	22 31	22 27	22 23	22 18	22 16	22 13	22 9	22 5	22 3	22 1	21 59	21 56	21 53
19	23 18	23 18	23 18	23 18	23 18	23 18	23 18	23 18	23 18	23 18	23 18	23 18	23 18
20	....	....	....	....	....	....	....	....	....	....	....	....	....
21	0 7	0 11	0 15	0 20	0 22	0 25	0 29	0 33	0 35	0 37	0 40	0 42	0 45
22	0 58	1 6	1 14	1 23	1 29	1 34	1 42	1 50	1 54	1 58	2 3	2 8	2 15
23	1 52	2 3	2 15	2 29	2 37	2 46	2 56	3 9	3 15	3 22	3 29	3 37	3 47
24	2 50	3 4	3 19	3 36	3 46	3 57	4 11	4 28	4 35	4 44	4 54	5 5	5 18
25	3 50	4 6	4 23	4 43	4 54	5 8	5 23	5 42	5 52	6 2	6 13	6 26	6 42
26	4 52	5 9	5 27	5 48	6 0	6 13	6 30	6 50	6 59	7 10	7 22	7 36	7 52
27	5 54	6 10	6 27	6 47	6 58	7 11	7 27	7 46	7 54	8 4	8 16	8 28	8 43
28	6 54	7 8	7 23	7 40	7 50	8 1	8 14	8 30	8 38	8 46	8 55	9 6	9 18
29	7 50	8 1	8 13	8 26	8 34	8 43	8 54	9 6	9 12	9 18	9 25	9 33	9 42
30	8 41	8 49	8 58	9 7	9 13	9 19	9 26	9 35	9 39	9 43	9 48	9 53	9 59
July 1	9 30	9 34	9 39	9 44	9 48	9 51	9 55	10 0	10 2	10 4	10 7	10 10	10 13
2	10 16	10 17	10 18	10 19	10 19	10 20	10 21	10 22	10 22	10 23	10 23	10 24	10 [illegible]

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE, MERIDIAN OF GREENWICH, 1919.

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July 1	21 54	21 51	21 48	21 45	21 43	21 41	21 38	21 36	21 34	21 33	21 31	21 29	21 27
2	22 39	22 40	22 40	22 41	22 42	22 42	22 43	22 44	22 45	22 45	22 46	22 46	22 47
3	23 22	23 26	23 30	23 36	23 39	23 42	23 46	23 51	23 53	23 56	23 58	....	....
4	....	....	....	....	....	....	....	....	....	....	....	0 1	0 4
5	0 5	0 13	0 21	0 30	0 35	0 41	0 48	0 56	1 0	1 4	1 9	1 15	1 21
6	0 49	1 0	1 11	1 23	1 30	1 39	1 49	2 0	2 6	2 12	2 19	2 27	2 36
7	1 34	1 47	2 1	2 16	2 26	2 36	2 48	3 4	3 11	3 18	3 28	3 38	3 49
8	2 20	2 35	2 51	3 9	3 20	3 32	3 47	4 4	4 13	4 22	4 33	4 45	4 59
9	3 8	3 24	3 42	4 2	4 13	4 27	4 42	5 2	5 11	5 22	5 33	5 47	6 3
10	3 58	4 14	4 32	4 52	5 4	5 18	5 34	5 55	6 4	6 15	6 27	6 41	6 58
11	4 48	5 4	5 21	5 41	5 53	6 6	6 22	6 41	6 50	7 0	7 12	7 25	7 41
12	5 38	5 53	6 9	6 27	6 38	6 50	7 4	7 21	7 29	7 38	7 48	8 0	8 13
13	6 28	6 41	6 54	7 10	7 19	7 29	7 41	7 55	8 2	8 9	8 18	8 27	8 37
14	7 18	7 27	7 38	7 50	7 57	8 4	8 14	8 25	8 30	8 35	8 41	8 48	8 56
15	8 6	8 12	8 19	8 28	8 32	8 37	8 43	8 50	8 54	8 57	9 1	9 6	9 11
16	8 54	8 57	9 0	9 4	9 6	9 8	9 11	9 14	9 16	9 18	9 19	9 21	9 24
17	9 42	9 41	9 40	9 40	9 39	9 39	9 38	9 37	9 37	9 37	9 36	9 36	9 35
18	10 31	10 26	10 22	10 16	10 14	10 10	10 6	10 1	9 59	9 57	9 54	9 52	9 48
19	11 22	11 14	11 5	10 56	10 50	10 44	10 36	10 28	10 24	10 19	10 14	10 9	10 3
20	12 15	12 4	11 52	11 38	11 30	11 21	11 10	10 58	10 52	10 46	10 38	10 30	10 21
21	13 12	12 57	12 42	12 25	12 15	12 4	11 50	11 34	11 27	11 18	11 9	10 58	10 46
22	14 10	13 54	13 37	13 18	13 6	12 53	12 38	12 19	12 10	12 0	11 49	11 36	11 22
23	15 10	14 54	14 36	14 16	14 4	13 50	13 34	13 14	13 5	12 54	12 42	12 28	12 12
24	16 11	15 55	15 38	15 18	15 7	14 54	14 38	14 19	14 10	14 0	13 49	13 36	13 20
25	17 9	16 55	16 40	16 23	16 13	16 1	15 48	15 31	15 24	15 15	15 5	14 54	14 41
26	18 4	17 53	17 41	17 27	17 19	17 10	16 59	16 46	16 40	16 33	16 26	16 17	16 8
27	18 56	18 48	18 40	18 30	18 24	18 18	18 10	18 1	17 57	17 53	17 47	17 42	17 35
28	19 45	19 40	19 36	19 30	19 27	19 24	19 19	19 15	19 12	19 10	19 7	19 4	19 0
29	20 31	20 30	20 29	20 28	20 28	20 27	20 26	20 25	20 25	20 24	20 24	20 23	20 23
30	21 16	21 19	21 21	21 24	21 26	21 28	21 31	21 34	21 35	21 37	21 38	21 40	21 42
31	22 0	22 6	22 12	22 20	22 24	22 28	22 34	22 41	22 44	22 48	22 51	22 56	23 0
Aug. 1	22 44	22 53	23 2	23 14	23 20	23 27	23 36	23 46	23 51	23 56	....	....	....
2	23 29	23 40	23 53	....	....	....	....	....	....	....	0 2	0 9	0 16
3	....	....	....	0 7	0 16	0 25	0 36	0 50	0 56	1 4	1 12	1 20	1 31
4	0 14	0 28	0 43	1 0	1 10	1 22	1 35	1 52	2 0	2 8	2 18	2 29	2 42
5	1 2	1 17	1 34	1 53	2 4	2 17	2 32	2 51	3 0	3 10	3 21	3 34	3 49
6	1 50	2 7	2 24	2 44	2 56	3 10	3 26	3 46	3 55	4 6	4 18	4 32	4 48
7	2 40	2 56	3 14	3 34	3 45	3 59	4 15	4 35	4 44	4 54	5 6	5 20	5 36
8	3 30	3 46	4 2	4 21	4 32	4 45	4 59	5 17	5 26	5 36	5 46	5 58	6 13
9	4 21	4 34	4 48	5 5	5 15	5 26	5 39	5 54	6 1	6 9	6 18	6 29	6 40
10	5 11	5 22	5 34	5 47	5 54	6 4	6 14	6 26	6 32	6 38	6 45	6 53	7 2
11	6 0	6 8	6 16	6 26	6 31	6 38	6 45	6 54	6 58	7 2	7 7	7 12	7 18
12	6 49	6 54	6 58	7 4	7 7	7 10	7 14	7 19	7 21	7 24	7 26	7 29	7 32
13	7 38	7 39	7 40	7 40	7 41	7 42	7 42	7 43	7 44	7 44	7 44	7 45	7 45
14	8 28	8 25	8 22	8 18	8 16	8 13	8 11	8 7	8 6	8 4	8 2	8 0	7 58
15	*9 19*	*9 12*	9 5	8 57	8 52	8 47	8 40	8 33	8 30	8 26	8 22	8 18	8 13
16	*10 12*	*10 2*	9 51	9 38	9 31	9 23	9 14	9 2	8 57	8 51	8 45	8 38	8 30
17	*11 7*	*10 54*	10 40	10 24	10 14	10 4	9 52	9 36	9 30	9 22	9 13	9 4	8 53

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July 1	9 30	9 34	9 39	9 44	9 48	9 51	9 55	10 0	10 2	10 4	10 7	10 10	10 13
2	10 16	10 17	10 18	10 19	10 19	10 20	10 21	10 22	10 22	10 23	10 23	10 24	10 24
3	11 0	10 57	10 55	10 52	10 50	10 48	10 46	10 43	10 42	10 40	10 39	10 37	10 35
4	11 43	11 37	11 31	11 24	11 20	11 16	11 10	11 4	11 2	10 58	10 55	10 51	10 47
5	12 27	12 18	12 9	11 58	11 52	11 45	11 36	11 27	11 22	11 17	11 13	11 6	10 58
6	13 11	12 59	12 47	12 33	12 25	12 16	12 5	11 52	11 46	11 39	11 32	11 24	11 14
7	13 56	13 43	13 28	13 11	13 1	12 50	12 37	12 21	12 14	12 5	11 56	11 46	11 33
8	14 44	14 28	14 12	13 53	13 42	13 29	13 14	12 56	12 47	12 37	12 26	12 14	12 0
9	15 32	15 16	14 58	14 38	14 26	14 13	13 57	13 37	13 28	13 17	13 5	12 51	12 35
10	16 22	16 6	15 48	15 28	15 16	15 2	14 46	14 26	14 16	14 6	13 54	13 40	13 23
11	17 12	16 57	16 40	16 21	16 10	15 57	15 41	15 22	15 14	15 4	14 52	14 39	14 24
12	18 3	17 49	17 34	17 17	17 7	16 56	16 42	16 25	16 18	16 9	15 59	15 48	15 35
13	18 52	18 41	18 29	18 15	18 6	17 57	17 46	17 33	17 27	17 20	17 12	17 3	16 54
14	19 41	19 33	19 24	19 13	19 8	19 1	18 53	18 43	18 39	18 34	18 29	18 23	18 16
15	20 29	20 24	20 19	20 13	20 9	20 5	20 1	19 55	19 53	19 50	19 47	19 43	19 39
16	21 17	21 16	21 14	21 13	21 12	21 11	21 10	21 8	21 8	21 7	21 6	21 5	21 4
17	22 5	22 8	22 11	22 14	22 15	22 17	22 20	22 23	22 24	22 25	22 27	22 29	22 31
18	22 55	23 1	23 8	23 16	23 20	23 25	23 31	23 38	23 41	23 45	23 49	23 53	23 58
19	23 47	23 57	....	....	....	....	....	....	....	....	....	....	....
20	....	....	0 7	0 19	0 26	0 34	0 43	0 55	1 0	1 6	1 12	1 20	1 28
21	0 42	0 55	1 8	1 24	1 33	1 44	1 56	2 11	2 19	2 26	2 35	2 46	2 57
22	1 39	1 54	2 11	2 29	2 40	2 53	3 8	3 26	3 34	3 44	3 55	4 8	4 22
23	2 39	2 55	3 13	3 33	3 45	3 58	4 15	4 34	4 44	4 54	5 6	5 20	5 36
24	3 39	3 56	4 13	4 33	4 45	4 58	5 14	5 34	5 43	5 53	6 5	6 18	6 34
25	4 39	4 54	5 10	5 28	5 39	5 51	6 5	6 23	6 31	6 40	6 50	7 2	7 15
26	5 36	5 48	6 2	6 17	6 26	6 36	6 48	7 2	7 9	7 16	7 24	7 34	7 44
27	6 29	6 39	6 49	7 1	7 8	7 15	7 24	7 34	7 39	7 44	7 50	7 57	8 4
28	7 20	7 26	7 32	7 40	7 44	7 49	7 55	8 1	8 4	8 8	8 11	8 15	8 20
29	8 7	8 10	8 13	8 16	8 18	8 20	8 22	8 25	8 26	8 27	8 29	8 31	8 33
30	8 53	8 52	8 51	8 50	8 49	8 49	8 48	8 47	8 46	8 46	8 45	8 45	8 44
31	9 37	9 33	9 29	9 23	9 20	9 17	9 13	9 9	9 6	9 4	9 2	8 59	8 56
Aug. 1	10 21	10 14	10 6	9 57	9 52	9 46	9 39	9 31	9 27	9 23	9 18	9 14	9 8
2	11 6	10 55	10 44	10 32	10 24	10 16	10 7	9 55	9 50	9 44	9 37	9 30	9 22
3	11 51	11 38	11 24	11 9	11 0	10 49	10 37	10 23	10 16	10 8	10 0	9 50	9 40
4	12 37	12 22	12 7	11 49	11 38	11 26	11 12	10 54	10 47	10 37	10 27	10 16	10 2
5	13 25	13 9	12 52	12 32	12 21	12 8	11 52	11 33	11 24	11 14	11 2	10 49	10 34
6	14 14	13 58	13 40	13 20	13 8	12 54	12 38	12 18	12 9	11 58	11 46	11 32	11 16
7	15 4	14 48	14 31	14 11	14 0	13 47	13 31	13 12	13 2	12 52	12 40	12 27	12 11
8	15 55	15 40	15 24	15 6	14 56	14 44	14 30	14 12	14 4	13 54	13 44	13 32	13 18
9	16 45	16 32	16 19	16 4	15 55	15 45	15 33	15 18	15 11	15 4	14 55	14 46	14 34
10	17 35	17 25	17 15	17 3	16 56	16 48	16 39	16 28	16 23	16 17	16 11	16 3	15 55
11	18 24	18 18	18 11	18 3	17 59	17 54	17 48	17 41	17 37	17 34	17 30	17 25	17 20
12	19 13	19 10	19 7	19 4	19 2	19 0	18 58	18 55	18 53	18 52	18 50	18 48	18 46
13	20 2	20 3	20 5	20 6	20 7	20 8	20 9	20 10	20 11	20 11	20 12	20 13	20 14
14	20 52	20 57	21 3	21 9	21 12	21 16	21 21	21 26	21 29	21 32	21 35	21 39	21 43
15	21 44	21 53	22 2	22 12	22 19	22 26	22 34	22 44	22 48	22 53	22 59	23 5	23 12
16	*22 38*	*22 50*	23 3	23 17	23 26	23 35	23 47	....	....	....	....	....	....
17	*23 34*	*23 49*	....	....	....	....	....	0 0	0 7	0 14	0 22	0 31	0 [illegible]

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE, MERIDIAN OF GREENWICH, 1919.

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Aug. 16	10 12	10 2	9 51	9 38	9 31	9 23	9 14	9 2	8 57	8 51	8 45	8 38	8 30
17	11 7	10 54	10 40	10 24	10 14	10 4	9 52	9 36	9 30	9 22	9 13	9 4	8 53
18	12 4	11 49	11 33	11 14	11 3	10 51	10 36	10 18	10 10	10 1	9 50	9 38	9 24
19	13 3	12 47	12 29	12 9	11 57	11 44	11 28	11 8	10 59	10 49	10 37	10 24	10 8
20	14 2	13 46	13 28	13 8	12 57	12 44	12 28	12 8	11 59	11 49	11 37	11 24	11 8
21	14 59	14 44	14 29	14 10	14 0	13 48	13 34	13 16	13 8	12 59	12 48	12 36	12 23
22	15 54	15 42	15 29	15 13	15 5	14 55	14 43	14 28	14 22	14 14	14 6	13 56	13 45
23	16 47	16 37	16 27	16 16	16 9	16 2	15 53	15 42	15 37	15 32	15 25	15 19	15 11
24	17 36	17 30	17 24	17 16	17 12	17 7	17 2	16 55	16 52	16 48	16 44	16 40	16 35
25	18 23	18 21	18 18	18 15	18 14	18 11	18 9	18 6	18 5	18 4	18 2	18 0	17 59
26	19 9	19 10	19 11	19 12	19 13	19 14	19 15	19 16	19 17	19 17	19 18	19 19	19 20
27	19 54	19 58	20 3	20 8	20 11	20 15	20 19	20 24	20 26	20 29	20 32	20 35	20 38
28	20 38	20 46	20 54	21 3	21 8	21 14	21 22	21 30	21 34	21 39	21 44	21 49	21 56
29	21 22	21 33	21 44	21 57	22 5	22 13	22 23	22 35	22 41	22 47	22 54	23 2	23 11
30	22 8	22 21	22 35	22 51	23 0	23 10	23 23	23 38	23 45	23 53	....	....	....
31	22 55	23 10	23 25	23 43	23 54	....	....	....	....	....	0 2	0 12	0 24
Sept. 1	23 42	23 58	....	....	....	0 6	0 20	0 38	0 47	0 56	1 6	1 18	1 32
2	....	....	0 15	0 35	0 46	1 0	1 14	1 34	1 44	1 54	2 5	2 19	2 34
3	0 31	0 47	1 5	1 25	1 36	1 50	2 6	2 26	2 35	2 45	2 57	3 10	3 26
4	1 21	1 36	1 53	2 12	2 24	2 37	2 52	3 11	3 19	3 29	3 40	3 53	4 8
5	2 11	2 25	2 40	2 58	3 8	3 19	3 33	3 49	3 57	4 6	4 16	4 26	4 39
6	3 0	3 12	3 25	3 40	3 49	3 58	4 10	4 24	4 30	4 37	4 45	4 54	5 4
7	3 50	3 59	4 9	4 20	4 27	4 34	4 43	4 53	4 58	5 3	5 9	5 15	5 23
8	4 40	4 46	4 52	4 59	5 3	5 8	5 14	5 20	5 23	5 26	5 30	5 34	5 38
9	5 29	5 32	5 34	5 37	5 39	5 41	5 43	5 45	5 46	5 48	5 49	5 50	5 52
10	6 20	6 18	6 17	6 15	6 14	6 13	6 12	6 10	6 9	6 9	6 8	6 7	6 6
11	7 12	7 7	7 1	6 54	6 51	6 47	6 42	6 36	6 34	6 31	6 28	6 24	6 20
12	8 6	7 57	7 47	7 36	7 30	7 23	7 15	7 5	7 1	6 56	6 50	6 44	6 37
13	9 2	8 50	8 36	8 22	8 13	8 3	7 52	7 38	7 32	7 25	7 18	7 9	6 59
14	9 59	9 45	9 29	9 12	9 1	8 49	8 36	8 19	8 11	8 2	7 52	7 41	7 28
15	10 58	10 42	10 25	10 6	9 54	9 41	9 26	9 7	8 58	8 48	8 37	8 24	8 9
16	11 57	11 41	11 24	11 4	10 52	10 39	10 23	10 4	9 55	9 45	9 33	9 20	9 4
17	12 54	12 39	12 23	12 4	11 54	11 41	11 27	11 9	11 0	10 51	10 40	10 28	10 14
18	13 49	13 36	13 22	13 6	12 57	12 46	12 34	12 18	12 11	12 3	11 54	11 44	11 32
19	14 41	14 31	14 20	14 7	14 0	13 52	13 42	13 30	13 25	13 18	13 12	13 4	12 55
20	15 31	15 24	15 16	15 7	15 2	14 57	14 50	14 42	14 38	14 34	14 29	14 24	14 19
21	16 18	16 14	16 10	16 6	16 3	16 0	15 56	15 52	15 50	15 48	15 46	15 43	15 40
22	17 4	17 3	17 3	17 2	17 2	17 2	17 2	17 1	17 1	17 1	17 1	17 1	17 1
23	17 48	17 51	17 55	17 58	18 0	18 3	18 6	18 9	18 11	18 12	18 14	18 17	18 19
24	18 33	18 39	18 46	18 53	18 58	19 3	19 9	19 16	19 19	19 23	19 27	19 32	19 37
25	19 17	19 26	19 36	19 48	19 54	20 2	20 11	20 21	20 26	20 32	20 38	20 45	20 52
26	20 2	20 14	20 27	20 42	20 50	21 0	21 11	21 25	21 32	21 39	21 47	21 56	22 6
27	20 49	21 3	21 18	21 35	21 45	21 56	22 10	22 26	22 34	22 43	22 53	23 4	23 16
28	21 36	21 51	22 8	22 27	22 38	22 50	23 5	23 24	23 33	23 42	23 53	....	....
29	22 24	22 40	22 57	23 17	23 28	23 42	23 57	....	....	....	....	0 6	0 21
30	23 12	23 28	23 45	....	....	....	....	0 16	0 28	0 38	0 47	1 1	1 16
Oct. 1	....	....	....	0 5	0 16	0 29	0 44	1 3	1 12	1 22	1 34	1 47	2 2
2	0 1	0 16	0 32	0 50	1 1	1 13	1 27	1 44	1 52	2 0	2 12	2 23	[illegible]

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Aug. 16	22 38	22 50	23 3	23 17	23 26	23 35	23 47	....	....	....	....	....	....
17	23 34	23 49	....	....	....	....	....	0 0	0 7	0 14	0 22	0 31	0 42
18	....	....	0 4	0 22	0 32	0 44	0 58	1 15	1 23	1 32	1 42	1 54	2 7
19	0 32	0 48	1 5	1 25	1 37	1 50	2 5	2 25	2 34	2 44	2 56	3 9	3 24
20	1 31	1 48	2 5	2 25	2 37	2 50	3 6	3 26	3 35	3 46	3 58	4 11	4 27
21	2 29	2 45	3 1	3 20	3 32	3 44	3 59	4 17	4 26	4 35	4 46	4 59	5 13
22	3 26	3 40	3 54	4 10	4 20	4 31	4 44	4 59	5 7	5 14	5 23	5 34	5 45
23	4 20	4 31	4 42	4 55	5 3	5 12	5 22	5 34	5 39	5 45	5 52	6 0	6 8
24	5 11	5 18	5 26	5 36	5 41	5 47	5 54	6 2	6 6	6 10	6 15	6 20	6 26
25	5 59	6 3	6 8	6 13	6 16	6 19	6 23	6 27	6 29	6 32	6 34	6 37	6 40
26	6 46	6 46	6 47	6 48	6 48	6 49	6 49	6 50	6 50	6 51	6 51	6 52	6 52
27	7 30	7 28	7 25	7 22	7 20	7 18	7 15	7 12	7 11	7 9	7 8	7 6	7 4
28	8 15	8 9	8 3	7 55	7 51	7 46	7 41	7 34	7 31	7 28	7 24	7 20	7 16
29	9 0	8 51	8 41	8 30	8 24	8 17	8 8	7 58	7 54	7 49	7 43	7 37	7 30
30	9 45	9 33	9 21	9 6	8 58	8 49	8 38	8 25	8 19	8 12	8 4	7 56	7 47
31	10 31	10 17	10 2	9 45	9 35	9 24	9 11	8 55	8 48	8 39	8 30	8 20	8 8
Sept. 1	11 18	11 2	10 46	10 27	10 16	10 4	9 49	9 31	9 22	9 12	9 2	8 49	8 35
2	12 6	11 50	11 33	11 13	11 1	10 48	10 32	10 13	10 4	9 53	9 42	9 28	9 12
3	12 55	12 39	12 22	12 2	11 50	11 37	11 21	11 2	10 52	10 42	10 30	10 17	10 1
4	13 45	13 30	13 13	12 55	12 44	12 31	12 16	11 58	11 50	11 40	11 29	11 17	11 2
5	14 35	14 21	14 7	13 50	13 41	13 30	13 17	13 1	12 54	12 45	12 36	12 25	12 13
6	15 24	15 13	15 2	14 48	14 41	14 32	14 21	14 9	14 3	13 56	13 49	13 41	13 32
7	16 14	16 6	15 58	15 48	15 43	15 36	15 29	15 20	15 16	15 12	15 6	15 1	14 54
8	17 3	16 59	16 55	16 49	16 46	16 43	16 39	16 34	16 32	16 29	16 27	16 24	16 20
9	17 53	17 53	17 52	17 52	17 52	17 51	17 51	17 50	17 50	17 50	17 49	17 49	17 49
10	18 44	18 48	18 52	18 56	18 58	19 1	19 4	19 8	19 10	19 12	19 14	19 16	19 19
11	19 37	19 44	19 52	20 1	20 6	20 12	20 19	20 27	20 31	20 35	20 40	20 45	20 51
12	20 32	20 43	20 54	21 7	21 15	21 24	21 34	21 46	21 52	21 58	22 5	22 13	22 22
13	21 29	21 42	21 57	22 14	22 23	22 34	22 47	23 3	23 11	23 19	23 28	23 39	23 52
14	22 27	22 43	22 59	23 18	23 30	23 42	23 57	....	....	....	....	....	....
15	23 26	23 43	....	....	....	....	....	0 16	0 24	0 34	0 45	0 58	1 13
16	....	....	0 0	0 20	0 31	0 45	1 1	1 20	1 29	1 39	1 51	2 4	2 20
17	0 24	0 40	0 57	1 16	1 28	1 40	1 56	2 14	2 23	2 32	2 44	2 56	3 11
18	1 21	1 35	1 50	2 7	2 17	2 29	2 42	2 58	3 6	3 14	3 24	3 34	3 47
19	2 15	2 26	2 39	2 53	3 1	3 11	3 22	3 35	3 41	3 47	3 55	4 3	4 13
20	3 5	3 14	3 24	3 34	3 40	3 47	3 55	4 4	4 9	4 14	4 19	4 25	4 32
21	3 54	3 59	4 5	4 12	4 16	4 20	4 24	4 30	4 33	4 36	4 39	4 43	4 47
22	4 40	4 42	4 44	4 47	4 48	4 50	4 52	4 54	4 55	4 56	4 57	4 59	5 0
23	5 25	5 24	5 22	5 21	5 20	5 19	5 18	5 16	5 15	5 14	5 14	5 13	5 12
24	6 10	6 5	6 0	5 55	5 51	5 48	5 43	5 38	5 36	5 33	5 30	5 27	5 24
25	6 54	6 46	6 38	6 29	6 23	6 17	6 10	6 2	5 58	5 53	5 49	5 43	5 37
26	7 39	7 29	7 17	7 5	6 57	6 49	6 39	6 27	6 22	6 16	6 9	6 2	5 53
27	8 25	8 12	7 58	7 43	7 34	7 23	7 11	6 56	6 49	6 42	6 33	6 24	6 13
28	9 12	8 57	8 41	8 24	8 13	8 1	7 47	7 30	7 22	7 12	7 2	6 51	6 38
29	9 59	9 44	9 27	9 7	8 56	8 43	8 28	8 9	8 0	7 50	7 39	7 26	7 11
30	10 48	10 32	10 14	9 55	9 43	9 30	9 14	8 55	8 46	8 36	8 24	8 11	7 55
Oct. 1	*11 36*	*11 21*	*11 4*	10 45	10 34	10 21	10 6	9 48	9 39	9 29	9 18	9 5	[illegible]
2	*12 25*	*12 11*	*11 56*	11 39	11 28	11 17	11 3	10 46	10 39	10 30	10 20	10 9	[illegible]

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	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 1	....	....	....	0 5	0 16	0 29	0 44	1 3	1 12	1 22	1 34	1 47	2 2
2	0 1	0 16	0 32	0 50	1 1	1 13	1 27	1 44	1 52	2 0	2 12	2 23	2 37
3	0 50	1 3	1 17	1 33	1 42	1 52	2 5	2 20	2 26	2 34	2 43	2 52	3 4
4	1 39	1 49	2 1	2 13	2 21	2 29	2 39	2 51	2 56	3 2	3 9	3 16	3 25
5	2 28	2 35	2 43	2 52	2 57	3 3	3 10	3 18	3 22	3 26	3 30	3 36	3 41
6	3 17	3 21	3 25	3 30	3 33	3 36	3 40	3 44	3 46	3 49	3 51	3 54	3 56
7	4 7	4 7	4 8	4 8	4 8	4 9	4 9	4 10	4 10	4 10	4 10	4 10	4 11
8	4 58	4 55	4 51	4 47	4 45	4 42	4 39	4 35	4 34	4 32	4 30	4 28	4 25
9	5 52	5 45	5 38	5 29	5 24	5 18	5 11	5 4	5 0	4 56	4 52	4 47	4 41
10	6 49	6 38	6 27	6 14	6 6	5 58	5 48	5 36	5 31	5 25	5 18	5 11	5 2
11	7 48	7 34	7 20	7 4	6 54	6 43	6 30	6 15	6 7	6 0	5 50	5 40	5 29
12	8 49	8 33	8 17	7 58	7 47	7 34	7 20	7 1	6 53	6 44	6 33	6 21	6 7
13	9 50	9 34	9 16	8 57	8 45	8 32	8 16	7 57	7 48	7 38	7 27	7 14	6 58
14	10 49	10 33	10 17	9 58	9 47	9 34	9 20	9 1	8 53	8 43	8 32	8 20	8 5
15	11 45	11 32	11 17	11 0	10 51	10 40	10 27	10 11	10 3	9 55	9 46	9 35	9 22
16	12 39	12 28	12 16	12 2	11 54	11 45	11 35	11 22	11 16	11 10	11 2	10 54	10 44
17	13 29	13 20	13 12	13 2	12 56	12 50	12 42	12 33	12 29	12 25	12 19	12 14	12 7
18	14 16	14 11	14 6	14 0	13 57	13 53	13 48	13 43	13 41	13 38	13 35	13 32	13 28
19	15 1	15 0	14 58	14 57	14 56	14 54	14 53	14 52	14 51	14 50	14 50	14 49	14 48
20	15 46	15 48	15 50	15 52	15 53	15 55	15 56	15 59	16 0	16 1	16 2	16 4	16 5
21	16 29	16 35	16 40	16 46	16 50	16 54	17 0	17 5	17 8	17 11	17 14	17 18	17 22
22	17 14	17 22	17 31	17 41	17 46	17 53	18 1	18 10	18 15	18 19	18 25	18 31	18 38
23	17 58	18 9	18 21	18 34	18 42	18 51	19 2	19 14	19 20	19 27	19 34	19 42	19 52
24	18 44	18 58	19 12	19 28	19 37	19 48	20 1	20 16	20 24	20 32	20 41	20 51	21 3
25	19 31	19 46	20 2	20 20	20 31	20 43	20 58	21 15	21 24	21 33	21 44	21 56	22 10
26	20 19	20 35	20 52	21 11	21 22	21 35	21 51	22 10	22 19	22 29	22 40	22 53	23 9
27	21 7	21 23	21 40	21 59	22 11	22 24	22 39	22 58	23 7	23 17	23 29	23 42	23 57
28	21 55	22 10	22 27	22 45	22 56	23 8	23 23	23 41	23 49	23 58	....	....	....
29	22 43	22 57	23 11	23 28	23 38	23 49	....	....	....	....	0 9	0 21	0 35
30	23 31	23 42	23 54	....	....	....	0 2	0 18	0 25	0 33	0 42	0 53	1 5
31	....	....	....	0 8	0 17	0 26	0 36	0 49	0 56	1 2	1 10	1 18	1 27
Nov. 1	0 18	0 27	0 36	0 47	0 53	1 0	1 8	1 18	1 22	1 27	1 32	1 38	1 45
2	1 5	1 11	1 17	1 24	1 28	1 32	1 37	1 44	1 46	1 49	1 53	1 56	2 1
3	1 54	1 56	1 58	2 0	2 2	2 4	2 6	2 8	2 9	2 10	2 12	2 13	2 14
4	2 43	2 42	2 40	2 38	2 37	2 36	2 35	2 33	2 32	2 31	2 31	2 30	2 28
5	3 35	3 30	3 24	3 18	3 14	3 10	3 5	3 0	2 57	2 54	2 51	2 48	2 44
6	4 30	4 21	4 12	4 1	3 54	3 47	3 39	3 30	3 25	3 20	3 15	3 9	3 2
7	5 29	5 16	5 4	4 49	4 40	4 30	4 19	4 5	3 59	3 52	3 44	3 35	3 26
8	6 30	6 16	6 0	5 42	5 32	5 20	5 6	4 49	4 41	4 32	4 23	4 11	3 58
9	7 33	7 17	7 0	6 41	6 30	6 17	6 1	5 43	5 34	5 24	5 13	5 0	4 45
10	8 36	8 20	8 3	7 44	7 32	7 20	7 4	6 46	6 37	6 27	6 16	6 3	5 48
11	9 36	9 22	9 6	8 49	8 38	8 27	8 13	7 56	7 48	7 39	7 29	7 18	7 4
12	10 32	10 20	10 7	9 53	9 44	9 35	9 23	9 9	9 3	8 56	8 47	8 38	8 28
13	11 25	11 16	11 6	10 55	10 49	10 41	10 33	10 23	10 18	10 12	10 7	10 0	9 52
14	12 14	12 8	12 2	11 55	11 51	11 46	11 41	11 34	11 32	11 28	11 25	11 20	11 16
15	13 0	12 58	12 56	12 52	12 51	12 48	12 46	12 44	12 43	12 41	12 40	12 38	12 36
16	13 44	13 46	13 47	13 48	13 48	13 49	13 50	13 51	13 52	13 52	13 53	13 54	13 5[illegible]

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Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 1	11 36	11 21	11 4	10 45	10 34	10 21	10 6	9 48	9 39	9 29	9 18	9 5	8 50
2	12 25	12 11	11 56	11 39	11 28	11 17	11 3	10 46	10 39	10 30	10 20	10 9	9 56
3	13 14	13 2	12 49	12 34	12 26	12 16	12 4	11 50	11 44	11 37	11 29	11 20	11 9
4	14 2	13 53	13 43	13 32	13 25	13 18	13 9	12 59	12 54	12 48	12 42	12 35	12 28
5	14 51	14 45	14 39	14 31	14 27	14 22	14 17	14 10	14 7	14 4	14 0	13 55	13 51
6	15 40	15 38	15 36	15 33	15 31	15 29	15 27	15 25	15 23	15 22	15 21	15 19	15 17
7	16 31	16 33	16 34	16 36	16 37	16 38	16 40	16 41	16 42	16 43	16 44	16 45	16 46
8	17 24	17 29	17 35	17 42	17 46	17 50	17 55	18 1	18 4	18 7	18 10	18 14	18 18
9	18 19	18 28	18 38	18 49	18 56	19 3	19 11	19 22	19 26	19 32	19 38	19 44	19 52
10	19 17	19 29	19 42	19 58	20 6	20 16	20 28	20 42	20 49	20 57	21 5	21 15	21 26
11	20 17	20 32	20 47	21 5	21 16	21 28	21 42	22 0	22 8	22 17	22 28	22 39	22 53
12	21 18	21 34	21 51	22 10	22 22	22 35	22 50	23 9	23 18	23 28	23 40	23 53	....
13	22 18	22 34	22 51	23 10	23 22	23 34	23 50	....	....	....	....	....	0 8
14	23 16	23 31	23 46	....	....	....	....	0 9	0 18	0 27	0 38	0 51	1 6
15	....	....	....	0 4	0 14	0 26	0 40	0 57	1 6	1 14	1 24	1 35	1 48
16	0 11	0 24	0 37	0 52	1 0	1 10	1 22	1 36	1 42	1 50	1 58	2 6	2 17
17	1 3	1 12	1 23	1 34	1 41	1 48	1 57	2 8	2 12	2 18	2 24	2 30	2 38
18	1 52	1 58	2 5	2 13	2 17	2 22	2 28	2 35	2 38	2 41	2 45	2 49	2 54
19	2 38	2 41	2 44	2 48	2 50	2 53	2 55	2 59	3 0	3 2	3 3	3 5	3 8
20	3 23	3 22	3 22	3 22	3 22	3 22	3 21	3 21	3 21	3 20	3 20	3 20	3 20
21	4 7	4 3	4 0	3 55	3 53	3 50	3 47	3 43	3 41	3 39	3 37	3 34	3 32
22	4 51	4 44	4 37	4 29	4 24	4 19	4 13	4 6	4 2	3 59	3 55	3 50	3 45
23	5 35	5 26	5 16	5 4	4 57	4 50	4 41	4 30	4 25	4 20	4 14	4 7	4 0
24	6 21	6 9	5 56	5 41	5 33	5 23	5 12	4 58	4 52	4 45	4 37	4 28	4 18
25	7 7	6 53	6 38	6 21	6 11	6 0	5 46	5 30	5 22	5 14	5 4	4 54	4 41
26	7 54	7 39	7 23	7 4	6 53	6 40	6 26	6 7	5 59	5 49	5 38	5 26	5 12
27	8 42	8 26	8 10	7 50	7 38	7 25	7 10	6 51	6 42	6 32	6 20	6 7	5 52
28	9 31	9 15	8 58	8 39	8 28	8 14	8 0	7 41	7 32	7 22	7 10	6 58	6 42
29	10 19	10 4	9 49	9 31	9 20	9 8	8 54	8 37	8 29	8 19	8 9	7 57	7 43
30	11 6	10 54	10 40	10 24	10 15	10 5	9 52	9 38	9 30	9 23	9 14	9 4	8 52
31	11 54	11 43	11 32	11 20	11 12	11 4	10 54	10 42	10 37	10 31	10 24	10 16	10 8
Nov. 1	12 41	12 34	12 26	12 17	12 12	12 6	11 59	11 50	11 46	11 42	11 37	11 32	11 26
2	13 28	13 24	13 20	13 15	13 12	13 9	13 5	13 1	12 59	12 56	12 54	12 51	12 48
3	14 17	14 16	14 16	14 16	14 16	14 15	14 15	14 14	14 14	14 14	14 14	14 14	14 13
4	15 7	15 11	15 14	15 19	15 21	15 24	15 27	15 31	15 32	15 34	15 36	15 39	15 42
5	16 1	16 8	16 16	16 24	16 30	16 35	16 42	16 50	16 54	16 58	17 3	17 8	17 14
6	16 57	17 8	17 20	17 33	17 40	17 49	17 59	18 12	18 17	18 24	18 31	18 39	18 48
7	17 58	18 11	18 26	18 42	18 52	19 3	19 16	19 32	19 40	19 48	19 58	20 9	20 21
8	19 0	19 16	19 32	19 51	20 2	20 15	20 30	20 48	20 57	21 7	21 18	21 30	21 45
9	20 3	20 19	20 36	20 56	21 7	21 20	21 36	21 55	22 4	22 14	22 25	22 38	22 54
10	21 5	21 20	21 36	21 55	22 5	22 18	22 32	22 50	22 58	23 8	23 18	23 30	23 44
11	22 3	22 16	22 31	22 47	22 56	23 7	23 19	23 34	23 41	23 49	23 58	....	....
12	22 58	23 8	23 20	23 32	23 40	23 48	23 58	....	....	....	....	0 7	0 18
13	23 49	23 56	....	....	....	....	....	0 9	0 15	0 20	0 27	0 34	0 43
14	....	....	0 4	0 13	0 18	0 24	0 30	0 38	0 42	0 46	0 50	0 55	1 1
15	0 36	0 40	0 44	0 50	0 52	0 56	0 59	1 3	1 5	1 8	1 10	1 12	1 15
16	*1 22*	*1 22*	*1 23*	1 24	1 24	1 25	1 26	1 26	1 27	1 27	1 27	1 28	[illegible]

LOCAL ASTRONOMICAL MEAN TIME OF MOONRISE, MERIDIAN OF GREENWICH.

1919.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To obtain standard time, see directions on page 704.

For other longitudes and for southern latitudes see page 738.

Date. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Nov. 16	13 44	13 46	13 47	13 48	13 48	13 49	13 50	13 51	13 52	13 52	13 53	13 54	13 54
17	14 28	14 32	14 37	14 42	14 45	14 48	14 52	14 57	15 0	15 2	15 4	15 8	15 11
18	15 12	15 19	15 27	15 36	15 41	15 47	15 54	16 2	16 6	16 10	16 15	16 21	16 27
19	15 56	16 6	16 17	16 30	16 37	16 45	16 54	17 6	17 11	17 17	17 24	17 32	17 40
20	16 41	16 54	17 7	17 23	17 32	17 42	17 54	18 9	18 16	18 28	18 32	18 41	18 53
21	17 28	17 42	17 58	18 15	18 26	18 38	18 52	19 9	19 17	19 26	19 36	19 47	20 1
22	18 15	18 31	18 48	19 7	19 18	19 31	19 46	20 5	20 13	20 23	20 35	20 48	21 2
23	19 4	19 20	19 36	19 56	20 8	20 21	20 36	20 55	21 4	21 14	21 26	21 39	21 54
24	19 52	20 7	20 24	20 43	20 54	21 7	21 21	21 40	21 49	21 58	22 9	22 22	22 36
25	20 40	20 54	21 9	21 26	21 37	21 48	22 2	22 18	22 26	22 35	22 44	22 55	23 8
26	21 27	21 39	21 52	22 7	22 16	22 26	22 38	22 52	22 58	23 5	23 13	23 22	23 32
27	22 14	22 23	22 34	22 46	22 52	23 0	23 9	23 20	23 25	23 31	23 37	23 44	23 51
28	23 0	23 6	23 14	23 22	23 27	23 32	23 39	23 46	23 50	23 53	23 57	....	....
29	23 46	23 50	23 53	23 58	....	....	....	....	....	....	....	0 2	0 7
30	....	....	....	....	0 0	0 3	0 6	0 10	0 12	0 14	0 16	0 18	0 21
Dec. 1	0 33	0 33	0 33	0 33	0 34	0 34	0 34	0 34	0 34	0 34	0 34	0 34	0 34
2	1 22	1 18	1 15	1 10	1 8	1 5	1 2	0 58	0 57	0 55	0 53	0 51	0 48
3	2 13	2 6	1 59	1 50	1 45	1 40	1 33	1 26	1 22	1 18	1 14	1 10	1 4
4	3 8	2 58	2 47	2 34	2 27	2 18	2 9	1 57	1 52	1 46	1 39	1 32	1 24
5	4 8	3 54	3 40	3 24	3 14	3 3	2 50	2 35	2 28	2 20	2 11	2 2	1 50
6	5 10	4 54	4 38	4 19	4 8	3 56	3 41	3 23	3 15	3 5	2 55	2 43	2 29
7	6 14	5 58	5 41	5 21	5 10	4 56	4 41	4 22	4 13	4 3	3 51	3 38	3 23
8	7 17	7 2	6 46	6 27	6 16	6 4	5 49	5 30	5 22	5 12	5 2	4 49	4 35
9	8 18	8 4	7 50	7 34	7 24	7 14	7 1	6 45	6 38	6 30	6 21	6 10	5 58
10	9 14	9 4	8 52	8 40	8 32	8 24	8 14	8 2	7 57	7 50	7 43	7 36	7 27
11	10 6	9 59	9 52	9 43	9 38	9 32	9 26	9 18	9 14	9 10	9 5	9 0	8 54
12	10 55	10 52	10 48	10 43	10 40	10 38	10 34	10 30	10 28	10 26	10 24	10 22	10 19
13	11 42	11 41	11 41	11 41	11 41	11 40	11 40	11 40	11 40	11 40	11 40	11 40	11 40
14	12 26	12 29	12 33	12 36	12 39	12 41	12 44	12 48	12 49	12 51	12 53	12 55	12 58
15	13 10	13 16	13 23	13 31	13 35	13 40	13 46	13 53	13 57	14 0	14 4	14 9	14 14
16	13 54	14 4	14 13	14 25	14 31	14 38	14 47	14 58	15 3	15 8	15 14	15 21	15 28
17	14 39	14 51	15 3	15 18	15 26	15 36	15 47	16 1	16 7	16 14	16 22	16 31	16 42
18	15 25	15 39	15 54	16 10	16 20	16 32	16 45	17 2	17 9	17 18	17 28	17 38	17 51
19	16 12	16 27	16 44	17 2	17 13	17 26	17 41	17 59	18 8	18 17	18 28	18 40	18 55
20	17 0	17 16	17 33	17 52	18 4	18 17	18 32	18 52	19 1	19 11	19 22	19 36	19 51
21	17 49	18 4	18 21	18 40	18 52	19 5	19 20	19 39	19 47	19 58	20 9	20 22	20 36
22	18 37	18 52	19 7	19 26	19 36	19 48	20 2	20 20	20 28	20 37	20 47	20 58	21 12
23	19 25	19 38	19 52	20 8	20 17	20 27	20 40	20 55	21 2	21 9	21 18	21 28	21 39
24	20 12	20 23	20 34	20 47	20 54	21 3	21 13	21 25	21 30	21 36	21 43	21 51	21 59
25	20 58	21 6	21 14	21 24	21 29	21 36	21 43	21 51	21 56	22 0	22 5	22 10	22 16
26	21 44	21 48	21 54	21 59	22 2	22 6	22 11	22 16	22 18	22 21	22 24	22 27	22 30
27	22 30	22 31	22 32	22 34	22 35	22 36	22 38	22 39	22 40	22 41	22 42	22 42	22 44
28	23 16	23 14	23 12	23 10	23 8	23 7	23 5	23 2	23 2	23 0	22 59	22 58	22 56
29	....	23 59	23 53	23 47	23 43	23 38	23 34	23 28	23 25	23 22	23 18	23 15	23 11
30	0 5	....	....	....	....	....	....	23 56	23 51	23 46	23 41	23 34	23 28
31	*0 56*	*0 47*	0 38	0 27	0 21	0 13	0 5	....	....	....	....	....	23 50
32	*1 51*	*1 39*	1 26	1 12	1 3	0 54	0 42	0 29	0 23	0 16	0 8	0 0	....

CAL ASTRONOMICAL MEAN TIME OF MOONSET, MERIDIAN OF GREENWICH, 1919.

To obtain civil time, write P. M. after the astronomical time if it is less than twelve hours; reater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one :he day.

To obtain standard time, see directions on page 704.

For other longitudes and for southern latitudes see page 738.

te. \ Lat.	0°	+10°	+20°	+30°	+35°	+40°	+45°	+50°	+52°	+54°	+56°	+58°	+60°
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
v. 16	1 22	1 22	1 23	1 24	1 24	1 25	1 26	1 26	1 27	1 27	1 27	1 28	1 28
17	2 6	2 4	2 0	1 57	1 56	1 54	1 51	1 48	1 47	1 46	1 44	1 42	1 40
18	2 49	2 44	2 38	2 30	2 27	2 22	2 17	2 11	2 8	2 5	2 1	1 57	1 53
19	3 33	3 25	3 16	3 5	2 59	2 52	2 44	2 34	2 30	2 25	2 20	2 14	2 7
20	4 18	4 7	3 55	3 41	3 33	3 24	3 14	3 1	2 55	2 48	2 41	2 33	2 24
21	5 4	4 51	4 36	4 20	4 10	3 59	3 46	3 31	3 23	3 16	3 7	2 57	2 45
22	5 51	5 36	5 20	5 2	4 51	4 39	4 24	4 7	3 58	3 49	3 39	3 27	3 13
23	6 39	6 23	6 6	5 47	5 35	5 22	5 7	4 48	4 39	4 29	4 18	4 5	3 50
24	7 27	7 11	6 54	6 35	6 24	6 11	5 55	5 36	5 27	5 17	5 6	4 53	4 37
25	8 15	8 0	7 44	7 26	7 15	7 3	6 48	6 30	6 22	6 12	6 2	5 49	5 35
26	9 3	8 50	8 35	8 19	8 9	7 58	7 45	7 29	7 22	7 14	7 4	6 54	6 41
27	9 50	9 38	9 26	9 13	9 5	8 56	8 45	8 32	8 26	8 19	8 12	8 3	7 54
28	10 36	10 27	10 18	10 8	10 2	9 55	9 47	9 38	9 33	9 28	9 23	9 16	9 10
29	11 22	11 17	11 11	11 4	11 1	10 56	10 51	10 45	10 42	10 39	10 36	10 32	10 28
30	12 8	12 6	12 4	12 2	12 1	11 59	11 57	11 55	11 54	11 53	11 52	11 50	11 49
c. 1	12 56	12 58	13 0	13 1	13 3	13 4	13 5	13 7	13 8	13 9	13 10	13 11	13 12
2	13 46	13 51	13 57	14 4	14 7	14 11	14 16	14 22	14 25	14 28	14 31	14 35	14 39
3	14 39	14 48	14 58	15 8	15 15	15 22	15 30	15 40	15 45	15 50	15 56	16 2	16 10
4	15 36	15 48	16 1	16 16	16 25	16 34	16 46	17 0	17 7	17 14	17 22	17 31	17 42
5	16 37	16 51	17 7	17 25	17 35	17 47	18 1	18 19	18 27	18 36	18 46	18 58	19 11
6	17 40	17 56	18 13	18 32	18 44	18 57	19 12	19 31	19 40	19 50	20 2	20 15	20 30
7	18 44	19 0	19 17	19 36	19 47	20 0	20 16	20 34	20 43	20 53	21 4	21 16	21 31
8	19 46	20 0	20 16	20 33	20 44	20 55	21 9	21 25	21 33	21 42	21 51	22 2	22 15
9	20 45	20 57	21 10	21 24	21 32	21 42	21 53	22 6	22 12	22 19	22 26	22 35	22 44
10	21 40	21 48	21 58	22 8	22 14	22 21	22 29	22 39	22 43	22 48	22 53	23 0	23 6
11	22 30	22 36	22 41	22 48	22 52	22 56	23 1	23 6	23 9	23 12	23 15	23 19	23 23
12	23 18	23 20	23 22	23 24	23 26	23 27	23 29	23 31	23 32	23 33	23 34	23 35	23 37
13	....	....	....	23 59	23 58	23 56	23 55	23 54	23 53	23 52	23 51	23 50	23 49
14	0 3	0 2	0 0	....	....	....	....	....	....	....	....	....	....
15	0 48	0 43	0 38	0 32	0 29	0 25	0 21	0 16	0 14	0 11	0 8	0 5	0 2
16	1 32	1 24	1 16	1 6	1 1	0 55	0 48	0 39	0 35	0 31	0 26	0 21	0 15
17	2 16	2 6	1 54	1 42	1 34	1 26	1 16	1 5	0 59	0 53	0 47	0 39	0 31
18	3 1	2 49	2 35	2 19	2 10	2 0	1 48	1 33	1 27	1 19	1 11	1 1	0 51
19	3 48	3 33	3 18	3 0	2 50	2 38	2 24	2 7	1 59	1 50	1 40	1 29	1 16
20	4 35	4 20	4 3	3 44	3 33	3 20	3 4	2 46	2 37	2 27	2 16	2 3	1 49
21	5 24	5 8	4 51	4 31	4 20	4 7	3 51	3 32	3 23	3 13	3 1	2 48	2 32
22	6 12	5 57	5 40	5 21	5 10	4 58	4 43	4 24	4 15	4 6	3 54	3 42	3 27
23	7 0	6 46	6 31	6 14	6 4	5 52	5 39	5 22	5 14	5 5	4 55	4 44	4 31
24	7 48	7 36	7 23	7 8	7 0	6 50	6 38	6 24	6 18	6 10	6 2	5 53	5 43
25	8 34	8 25	8 15	8 3	7 57	7 49	7 40	7 29	7 24	7 19	7 12	7 5	6 58
26	9 20	9 14	9 7	8 59	8 55	8 49	8 43	8 36	8 33	8 29	8 25	8 20	8 15
27	10 6	10 3	9 59	9 56	9 53	9 51	9 48	9 44	9 42	9 41	9 39	9 36	9 34
28	10 52	10 52	10 53	10 53	10 53	10 53	10 54	10 54	10 54	10 54	10 54	10 55	10 55
29	11 39	11 43	11 47	11 52	11 55	11 58	12 1	12 6	12 8	12 10	12 12	12 15	12 18
30	12 29	12 36	12 44	12 53	12 58	13 4	13 11	13 19	13 23	13 28	13 32	13 37	13 43
31	13 22	13 33	13 44	13 57	14 4	14 13	14 23	14 35	14 41	14 47	14 54	15 2	15 11
32	*14 18*	*14 32*	*14 46*	15 3	15 12	15 23	15 36	15 52	15 59	16 7	16 16	16 28	16 39

FOR NORTHERN STATIONS NOT ON THE MERIDIAN OF GREENWICH, AND FOR SOUTHERN STATIONS.

For northern stations not on the meridian of Greenwich.—For longitudes twelve hours or less west from Greenwich obtain the data for the given latitude from Table X for the given date and for the date following; for longitudes twelve hours or less east from Greenwich obtain the data for the given latitude from Table X for the given date and for the date preceding. Subtract the time on the earlier date from the time on the later and multiply the difference by the twenty-fourth part of the longitude in hours and decimals of an hour, positive if west, negative if east. Apply the product as a correction to the time on the given date.

For southern stations.—The instant of moonrise or moonset for any station south of the equator is that of moonset or moonrise, respectively, at a place of the same latitude north of the equator whose longitude is twelve hours different from that at the southern station.

If the southern station be twelve hours or less west from Greenwich, and the phenomenon at that station occurs between noon and midnight, the local astronomical day will be the same at the southern and northern stations. If, however, the phenomenon at the southern station occurs between midnight and noon, the local astronomical day at the northern station will be one day later than at the southern.

If the southern station be twelve hours or less east from Greenwich, and the phenomenon at that station occurs between noon and midnight, the local astronomical day at the northern station will be one less than at the southern station. If, however, the phenomenon occurs between midnight and noon, the local astronomical day will be the same at the two stations.

Having thus determined the true astronomical day at the northern station, compute by the rule for northern latitudes. For the desired local time of moonrise at the southern station change the time of moonset at the northern station twelve hours. For the desired local time of moonset at the southern station change the time of moonrise at the northern station twelve hours.

Example.—December 20, 1919, civil date, find the time of moonrise and moonset in longitude $4^h\ 43^m$ west from Greenwich and in latitude 33° 30′ south.

The longitude of the northern station is $7^h.3$ east from Greenwich and its latitude is 33°.5 N. Upon inspection of Table X it is seen that the astronomical day at the southern station is December 19 for moonrise and December 20 for moonset, the former phenomenon occurring between midnight and noon, the latter between noon and midnight. For the northern station, in accordance with the precepts given above, both phenomena are to be computed for December 20.

At northern station—

	Moonrise.				Moonset.			
		d	h	m		d	h	m
Table X, Lat. +33°.5	Dec.	19	17	10	Dec.	19	2	53
Table X, Lat. +33°.5		20	18	0		20	3	36
Difference				50				43
Product of Diff. by $-\frac{7.3}{24}$				−15				−13
Local astronomical mean time . .			17	45			3	23

At southern station—

	Moonset.				Moonrise.			
Local astronomical mean time . . .			5	45			15	23
Civil time	Dec.	20	5	45 P. M.	Dec.	20	3	23 A. M.

ON THE ARRANGEMENT AND USE OF THE AMERICAN EPHEMERIS AND NAUTICAL ALMANAC.

There are in general use three different kinds of time, True Solar Time—also called Apparent Solar Time—Mean Solar Time, and Sidereal Time.

True or Apparent Solar Time is measured by the diurnal motion of the Sun, the length of the day being the interval between two successive transits of the Sun over the same meridian, and the time of day being the hour-angle of the Sun westward from the meridian. Owing to the obliquity of the ecliptic and to the lack of uniformity of the motion of the Earth in its orbit, the rate of motion of the Sun in hour-angle and the length of the apparent solar day are not constant. Therefore clocks and chronometers can not be regulated to apparent solar time, which may, however, be determined by observations of the Sun when visible.

Mean Solar Time is measured by the motion of a fictitious body called the mean Sun, which is supposed to move uniformly in the celestial equator, completing the circuit in one tropical year. Since mean solar time is uniform and regular in its passage, clocks and watches may be regulated to it, and those in ordinary use are usually so regulated.

Mean solar time can not, of course, be determined by direct observation, but may be determined indirectly by correcting observations of the Sun for the equation of time, or by converting to mean time sidereal time determined by observations of fixed stars.

The Equation of Time is the difference in hour-angle between the true Sun and the mean Sun. The true Sun is sometimes before and sometimes behind the mean Sun by an amount which varies from zero to about 16 minutes. The equation of time is given for Greenwich mean noon on pages 2–16 and for Washington apparent noon on pages 514–521.

The Mean Solar Day is the unit of mean solar time and is equal in length to the mean or average of all the true or apparent solar days of the year. It may be otherwise defined as the interval of time elapsing between two successive transits of the mean Sun across the meridian of any place.

Sidereal Time or star time, in general terms, is measured by the diurnal motion of the fixed stars, or, speaking more precisely, by the diurnal motion of that point on the celestial equator called the vernal equinox, from which the right ascensions of the heavenly bodies are measured. Astronomical clocks regulated to sidereal time are called sidereal clocks. Sidereal time may be determined from observations of stars whose right ascensions are known.

A Sidereal Day is very nearly the length of time in which the Earth rotates on its axis and is accurately defined as the time interval between two successive transits of the vernal equinox over the same meridian. The sidereal day is shorter than the mean solar day by $3^m\ 56^s.555$ sidereal time or $3^m\ 55^s.909$ *mean solar time, the* tropical year of 365.2422 mean solar days containi

366.2422 sidereal days. Sidereal time and the length of the sidereal day are subject to slight irregularities on account of small differences between the positions of the true and mean equinoxes.

The mean solar and sidereal days are each divided into 24 hours. About March 23 (civil date) of each year, about two days after the vernal equinox, there is an instant when the face of a sidereal clock shows the same time as a mean time clock, and the former gains on the latter $3^m\ 56^s.555$ sidereal time per mean solar day, so that at the end of a year it will have gained one sidereal day and will again agree with the mean time clock.

The Civil Day begins at midnight and comprises 24 hours, the hours being counted from 0 to 12 in two series; the first marked A. M., running from midnight to noon, and the second, marked P. M., running from noon to midnight.

The Astronomical Day begins at noon on the civil day of the same date, the 24 hours being counted from 0 to 24, running from noon of one day to noon of the next following day. Astronomical time as well as civil time may be either apparent or mean. Astronomical time only is used throughout this volume.

The civil day begins twelve hours before the astronomical day; therefore the first half of the civil day coincides with the last half of the preceding astronomical day, and the last half of the civil day coincides with the first half of the astronomical day of the same date. Hence we have the following rules:

To convert Civil Time into Astronomical Time.—If the civil time is marked A. M., take one from the day and add twelve to the hours; if the civil time is marked P. M., take away the designation P. M. Thus, January 9, 2 o'clock, A. M., civil time, is January 8, 14^h, astronomical time; and January 9, 2 o'clock, P. M., civil time, is January 9, 2^h, astronomical time.

To convert Astronomical Time into Civil Time.—If the astronomical time is less than twelve hours, write P. M. after it; if greater than twelve hours, subtract twelve hours from it, mark the result A. M., and add one to the day.

To convert Solar or Sidereal Time of any meridian B to that of another meridian A, add the difference of longitude expressed in time when A is east of B, and subtract the difference of longitude when A is west of B.

Greenwich mean time, which at any fixed observatory is obtained by applying the longitude to the local mean time, on board ship is usually taken from the mean time chronometer set to Greenwich time.

Greenwich mean noon of any date means the noon at the beginning of the astronomical day.

PART I.—THE EPHEMERIS FOR THE MERIDIAN OF GREENWICH.

Pages 2–17 contain for Greenwich mean noon of each day the *Sun's Apparent Right Ascension*, *Apparent Declination*, *Semidiameter*, *Horizontal Parallax*, *True Longitude*, and *Latitude*. They also contain the *Logarithm of the Radius Vector of the Earth*, the *Precession in Longitude*, the *Nutation in Longitude*, the *Aberration*, the *True Obliquity*, the *Equation of Time*, the *Sidereal Time or Right Ascension of Mean Sun*, and the *Mean Time of Sidereal Noon.* Adjoining columns contain, for each Greenwich mean noon, the Variation per

Hour for those of the quantities for which it seemed advisable to give a rate of motion. By multiplying any one of those variations by the hours and parts of an hour from Greenwich mean noon and adding the product algebraically to the corresponding quantity at noon, we obtain an approximate value of the quantity in question for any given Greenwich mean time. If great exactness is desired, the value of the hourly variation is found for the time halfway between Greenwich mean noon and the given Greenwich mean time before multiplying by the hours and parts of an hour from Greenwich mean noon.

It is to be noted that here, as elsewhere throughout the volume, the positive sign used with declinations or latitudes indicates north and the negative sign south.

The Sun's *Apparent Right Ascension* and *Declination* are affected both by aberration and by nutation, and therefore denote the *apparent* position of the *true* Sun. The Sun's *True Longitude* is the true geometric longitude not corrected for aberration; it is referred to the true equinox.

The Sun's *Latitude* is referred to the ecliptic of the date.

The Sun's *Declination* is required whenever that body is observed for the purpose of finding latitude, local time, or azimuth.

The Sun's *Semidiameter* is used in reducing the altitude of the upper or lower limb of the Sun to the altitude of the center; and in reducing the angular distance between the limb of the Sun and any other object to the distance from the center of the Sun.

The *Horizontal Parallax* is the angle subtended by the equatorial radius of the Earth, as seen from the center of the Sun.

The *Precession in Longitude* is the quantity to be applied to the longitude of the Sun referred to the mean equinox of the beginning of the Besselian fictitious year, i. e., the instant when the Sun's mean longitude is 280°, in order to refer it to the mean equinox of date.

The *Nutation in Longitude* is the quantity to be applied to the longitude of a body referred to the mean equinox of date in order to refer it to the true equinox, short-period terms being neglected.

The *Aberration* is the quantity to be subtracted from the true longitude of the Sun in order to obtain its apparent longitude.

The *True Obliquity* is the inclination of the Earth's equator to the ecliptic, short-period terms being neglected.

The corrections to the values of the nutation and the obliquity here given, to take account of the short-period terms, may be found on pages 215–216.

The *Equation of Time* is the apparent time of Greenwich mean noon, or the hour angle of the true Sun at that instant. When interpolated to any given Greenwich mean time, it is the correction to be applied to mean time in order to obtain apparent time.

The *Sidereal Time of Mean Noon* is the right ascension of the mean Sun at Greenwich mean noon. It may be reduced for the longitude or to any Greenwich mean time by using the hourly variation, $+9^s.8565$; or by Table III, page 687 of this volume, for reducing intervals of mean time to sidereal time. *It is useful in converting mean time to sidereal time.* We first find the *Greenwich mean time,* then the right ascension of the mean Sun for that time

and this being added to the local astronomical mean time, i. e., the hour angle of the mean Sun, will give the hour angle of the vernal equinox, or the sidereal time required.

The sidereal time of mean noon, reduced for the longitude of the place, is also used in converting sidereal time to mean time. Subtracting the reduced value from the given sidereal time gives the interval of sidereal time past noon, and that is converted into the required mean time by subtracting from it the corresponding reduction of a sidereal interval to a mean-time interval, taken from Table II, page 684 of this volume. If the sidereal interval is less than $3^m\ 56^s.555$, there are two mean times corresponding to the given sidereal time, one a few minutes after the preceding noon, and the other a few minutes before the following noon, the mean-time interval between these two mean times being $23^h\ 56^m\ 4^s.09$. The mean time, approximately known, will always show which one is to be taken. Instead of using Table II the reduction of a sidereal to a mean-time interval may be found by multiplying $-9^s.8296$ by the hours and parts of an hour of the sidereal interval.

The *Mean Time of Sidereal Noon* is the number of hours, minutes, and seconds after Greenwich mean noon when the vernal equinox passes the meridian of Greenwich; it may be reduced to any other meridian by using the hourly variation, $-9^s.8296$, to effect the necessary interpolation, or the reduction may be taken directly from Table II. In the same way the reduction may be made to any Greenwich sidereal time, and the result will then represent $24^h -$ Right Ascension of the Mean Sun. This column may be conveniently used for converting sidereal to mean time, or—which is the same problem—for finding the time of meridian passage of a star whose right ascension is known, by adding to the mean time of the *preceding* local sidereal noon, the mean time equivalent of the given sidereal time.

As examples of the use of pages 2–17:

1. Let the Sun's declination be required for April 14, 1919, $2^h\ 5^m\ 20^s$, P. M., at a place whose longitude is 58° 20′, or $3^h\ 53^m\ 20^s$ west from Greenwich:

		h m s
Local mean time	April 14,	2 5 20
Longitude from Greenwich (additive)		3 53 20
Greenwich mean time	April 14,	5 58 40

Reducing the minutes and seconds to decimals of an hour, we find that this moment is $5^h.978$ after Greenwich mean noon on April 14, or $18^h.022$ before Greenwich mean noon on April 15.

On page 6 of the Ephemeris we find that the variation of declination per hour is:

	″
At Greenwich mean noon, April 14	+54.28
At Greenwich mean noon, April 15	+53.89
Difference for one day	− 0.39

If great exactness is desired, we find the amount of this hourly variation for the time halfway between Greenwich noon and the time of observation: that is, for 3 hours after Greenwich noon of the 14th, this being half of 6 hours. *Three hours is 0.125* of a day; so the calculation is as follows:

		″
Variation at Greenwich mean noon, April 14 . .		+54.28
Change in 0.125 of a day . .	−0″.39×0.125	− 0.05
Variation at 3 hours after noon		+54.23
		° ′ ″
Declination at Greenwich noon, April 14		+9 7 29.6
Change in 5.978 hours . . .	+54″.23×5.978	+ 5 24.2
Sun's declination at time of observation		+9 12 53.8

With equal facility the computation might have been made backward from the succeeding noon. Thus in the example just given the time is $18^h.022$ before Greenwich noon of April 15; half this interval is about 0.375 of a day, and the hourly motion for the middle of the interval is $+54''.04$. Then we find:

		° ′ ″
Declination at Greenwich noon, April 15		+9 29 7.7
Change in −18.022 hours . .	+54″.04×−18.022	− 16 13.9
Sun's declination at time of observation		+9 12 53.8

It will always be well to make the calculation in both ways, as a check; but if the results differ slightly the one derived from the nearest noon should be regarded as the more accurate.

2. Let the Sun's right ascension and the equation of time be required for July 13, 1919, 10^h 3^m 30^s, A. M., mean time, at a place whose longitude is 85° 15′, or 5^h 41^m west from Greenwich.

		h m s
Local astronomical mean time	July 12,	22 3 30
Longitude from Greenwich (additive)		5 41 0
Greenwich mean time	July 13,	3 44 30=$3^h.7417$

		Sun's Right Ascension.		Equation of Time.
		h m s		m s
Greenwich noon, July 13		7 26 41.42		−5 25.21
Change in 3.7417 hours . .	$10^s.166$×3.7417	+38.04	$-0^s.310$×3.7417	− 1.16
		7 27 19.46		−5 26.37

In this case the hourly variations interpolated to half the interval, or $1^h.87$ after noon, have been used.

3. If the sidereal time is required for the same time and place, we have:

	h m s
Sidereal time at Greenwich mean noon, July 13	7 21 16.21
Reduction for 3^h 44^m 30^s from Table III, or $9^s.8565$×3.7417 .	+ 36.88
Add the local astronomical mean time	22 3 30.00
The required sidereal time (rejecting 24^h)	5 25 23.09

4. On July 13, 1919, A. M., at a place whose longitude is 85° 15′ W., suppose the sidereal time to be 5^h 25^m $23^s.09$ and that the corresponding mean time is required.

the given day and hour of Greenwich mean time; the *Var. per Min.* is multiplied by the minutes and parts of a minute of the Greenwich time, and the product is added numerically in case of the right ascension and algebraically in case of the declination.

Thus, suppose the Moon's right ascension and declination are required for January 25, 1919, $10^h\ 10^m\ 30^s$, astronomical mean time at Greenwich:

		Right Ascension.		Declination.
		h m s		° ′ ″
January 25, 10^h		15 23 37.37		−20 14 44.3
Change in 10.5 minutes .	$2^s.0994 \times 10.5$	22.04	$-5''.016 \times 10.5$	−52.7
January 25, $10^h\ 10^m\ 30^s$		15 23 59.41		−20 15 37.0

For the sake of precision the differences here employed have been interpolated for $5^m.2 = 0^h.09$.

Page 117 contains also the Phases of the Moon and the dates of the Moon's *Apogee* and *Perigee*, or greatest and least distances from the Earth.

Pages 118–133 contain for every Greenwich mean noon and midnight the *Moon's Longitude* and *Latitude* referred to the true equinox and the ecliptic, its *Semidiameter*, and its *Equatorial Horizontal Parallax*. The column adjoining that of the horizontal parallax gives the variation of that quantity per hour, by means of which it can be reduced to any other Greenwich mean time in the manner shown in the preceding examples. When allowing for change in the variation itself, note must be taken of the fact that the tabular interval is here 12 hours instead of 24. The quantity thus obtained is the equatorial horizontal parallax; to obtain the horizontal parallax at any given place, the correction for the latitude of the place must be applied. The reduction of the Moon's semidiameter may be readily found by multiplying the reduction of the horizontal parallax by 0.2725 (see page xi), or by simply computing the proportional part.

If, for example, the semidiameter of the Moon is to be taken out for March 10, 1919, 7^h, P. M., Greenwich mean time, we see that the difference of the semidiameters at noon and midnight of March 10 is $4''.8$; then,

$$12^h : 7^h - 4''.8 : 2''.8$$

which is the correction to be subtracted from the semidiameter at noon, because the semidiameter is decreasing. The Moon's semidiameter for March 10, 7^h, is therefore $15' \, 43''.9$.

The Moon's semidiameter and horizontal parallax are required for all observations of the Moon.

Pages 118–133 contain also: The *Moon's Age*, or the time elapsed since the preceding new Moon, given to tenths of a day; the mean time of the *Moon's Transit*, *Upper* and *Lower*, at Greenwich, given to tenths of a minute; and the *Variation per Hour* of the latter quantity, that is, the variation for one hour of longitude, by means of which the local time of an upper or lower transit of the Moon may be computed for any place whose longitude is known.

Pages 134–198 contain for each of the seven major planets the geocentric ephemeris followed immediately by the heliocentric ephemeris.

The geocentric ephemeris gives the planet's *Apparent Right Ascension* and *Apparent Declination* with the respective *Variations per Hour* or *per Day*. The positions thus given are referred to the true equator and equinox, and are corrected for aberration. The geocentric ephemeris gives also the *Logarithm of Distance from Earth* with the *Variation per Hour* or *per Day*, the planet's *Semidiameter* and *Horizontal Parallax*, and, to tenths of a minute, the time of *Transit Meridian of Greenwich*. All the data, except the last named, are given for Greenwich mean noon.

The right ascension and declination of a planet are required whenever it is observed for time, latitude, or azimuth. The mode of reducing the ephemeris positions of planets to other instants of Greenwich mean time is the same as that already given for the Sun. The local mean time of meridian transit of any planet at any place can be found by dividing the proper daily difference of the ephemeris times by 24, multiplying the quotient by the longitude of the place expressed in hours and fractions, and applying the product with its proper sign to the time of Greenwich transit.

The heliocentric ephemeris gives the Heliocentric Longitude, Mean Equinox *of Date; the Heliocentric Latitude;* and the Logarithm of Radius Vector; wi

their respective *Variations per Day.* The heliocentric longitude may be referred to the true equinox by applying nutation. The variations are given for the instant of Greenwich mean noon. The column *Reduction to Orbit* contains the correction to be applied to the heliocentric longitude in order to obtain the longitude measured along the orbit of the planet. This orbit longitude is equal to the distance from the mean equinox to the node, plus the distance from the node to the planet. The heliocentric latitude is referred to the ecliptic of the date. The *Logarithm of Radius Vector* is the logarithm of the distance of the center of the planet from that of the Sun.

PART II.—THE EPHEMERIS FOR THE MERIDIAN OF WASHINGTON.

Pages 200–201 contain formulæ for reducing mean positions of stars to apparent positions, including expressions for the Besselian star-numbers and star-constants, and for the independent star-numbers; the whole based upon the constants of the Paris Conference of May, 1896, and expressed in the notation of Bessel.

Pages 202–205 contain the logarithms of the *Besselian Star-Numbers, A, B, C, D,* for each Washington mean midnight, with the values of *E* appended at the bottoms of the pages. The terms of short period have been included. These numbers serve to reduce the mean place of a star at the beginning of the Besselian fictitious year to its apparent place at any of the dates for which the numbers are given, and in ordinary cases four-figure logarithms suffice; but where extreme accuracy is desired the logarithms of *A, C,* and *D* are sometimes needed to five places of decimals. Along with the solar day, the first column contains the sidereal hour of Washington mean midnight for certain dates, and by interpolation among them it is easy to find the sidereal time for which any set of quantities is given.

The following is an example of the reduction of a star to apparent place by the Besselian star-numbers:

Computation of the apparent place of 2 Aquilæ, May 26, 1919, for the upper transit at Washington.

log a	0.5165	log b	7.2458 n	log c	8.0452	log d	8.8235 n
log A	9.8375	log B	0.6351	log C	0.9002 n	log D	1.2683 n
log a'	0.5178	log b'	9.9940	log c'	9.4341	log d'	8.4164 n
log Aa	0.3540	log Bb	7.8809 n	log Cc	8.9454 n	log Dd	0.0918
log Aa'	0.3553	log Bb'	0.6291	log Cc'	0.3343 n	log Dd'	9.6847

		h	m	s		°	′	″
Mean Place, 1919.0	α_0	18	37	50.390	δ_0	−9	7	52.09
	Aa			+2.259	Aa'			+2.27
	Bb			−0.008	Bb'			+4.26
	Cc			−0.088	Cc'			−2.16
	Dd			+1.235	Dd'			+0.48
	E			+0.002	$\tau\mu'$			0.00
	$\tau\mu$			+0.001				
Apparent Place, May 26,	α	18	37	53.791	δ	−9	7	47.24

Pages 206–213 contain the *Independent Star-Numbers,* which can frequently be advantageously used instead of the *Besselian Star-Numbers.* The terms of short period have been included. These quantities are connected with those of Bessel by the relations given on page 200, which also contains the formulæ

and precepts for the application of both systems of numbers. In order to use the Besselian numbers, it is necessary to have the values of the star-constants, a, b, c, d, a', b', c', d', while the independent star-numbers render it possible to determine the apparent place of a star without computing these star-constants. Four-figure logarithms usually suffice, but where extreme accuracy is desired the logarithms of g and h are needed to five places of decimals, and G and H are needed to one-tenth of a minute of arc. The column τ gives the fraction of a year, counted from the beginning of the Besselian fictitious year to each date.

The following is an example of the reduction of a star to apparent place by the independent star-numbers:

Computation of the apparent place of 2 Aquilæ, May 26, 1919, for the upper transit at Washington.

	h m		° ′
$G=$	1 9.6	$\delta_0=$	− 9 7.9
$\alpha_0=$	18 37.8	$G+\alpha_0=$	$19^h\ 47^m.4$
$H=$	13 32.7	$H+\alpha_0=$	8 10.5

					h m s
log $\frac{1}{15}$	8.8239	log $\frac{1}{15}$	8.8239	α_0	18 37 50.390
log g	1.1598	log h	1.3049	$f+f'$	+2.116
log sin $(G+\alpha_0)$	9.9505 n	log sin $(H+\alpha_0)$	9.9254	(g)	+0.138
log tan δ_0	9.2061 n	log sec δ_0	0.0055	(h)	+1.147
log (g)	9.1403	log (h)	0.0597	$\tau\mu$	+0.001
				α	18 37 53.792
					° ′ ″
log g	1.1598	log h	1.3049	δ_0	− 9 7 52.09
log cos $(G+\alpha_0)$	9.6548	log cos $(H+\alpha_0)$	9.7317 n	(g')	+6.53
log (g')	0.8146	log sin δ_0	9.2006 n	(h')	+1.73
		log (h')	0.2372	(i)	−3.40
log i	0.5374 n			$\tau\mu'$	0.00
log cos δ_0	9.9945				
log (i)	0.5319 n			δ	− 9 7 47.23

Page 214 contains for every tenth sidereal day the *Besselian* and *Independent Star-Numbers,* exclusive of all short-period terms. They are useful in computing ephemerides of stars, similar to those on pages 316–513, for which data containing short-period terms should not be employed.

Pages 215–216 contain for Washington mean midnight of each day the short-period terms of the nutation in longitude and obliquity, for use in connection with the formulæ on page 201, and the coefficients mentioned later, which are given for each star on pages 316–513.

Pages 217–230 contain the *Mean Places of Ten-day Stars* for the beginning of the Besselian fictitious year. These pages give also the magnitude, spectral type, annual variations, and proper motions for each star. The annual variations are to be considered as the differential coefficients of each coordinate with respect to the time at the beginning of the year.

Page 231 contains, for the *Circumpolar Stars,* the same data as the immediately preceding pages do for the ten-day stars.

Pages 232–315 contain for every upper transit at Washington the apparent positions of seventeen northern and eighteen southern circumpolar stars arranged in the order of their right ascensions. The mean solar time of transit is given in the column *Washington Mean Time,* in order that each transit above

and below the pole may be readily identified. Suppose, for example, that the transit of Polaris below the pole on January 26 is to be found, and we wish to know whether it precedes or follows the upper transit of the same date. On page 232 we find that the upper transit occurs January 26.2; the lower transit, therefore, occurs January 26.7. But the lower transit of July 1 precedes the upper one, which occurs July 1.8. A transit occurring very nearly at noon may also be identified without a computation to ascertain the actual mean date, by simply noting the tenth of a day in the column *Washington Mean Time*.

The secant and tangent of the apparent declination for the 15th of each month and the mean place in right ascension and declination for the beginning of the year are given for each star at the foot of the page.

Pages 316–513 contain, for every tenth upper transit at Washington, the apparent places of 790 stars, being all those given in the list of mean places of ten-day stars. The *Washington Mean Time* in the left-hand column of each page gives the day and tenth of the transit, so that intermediate transits may be readily identified; and to facilitate interpolation, the differences of each coordinate are given for every ten days.

In connection with the ephemeris of each ten-day star there are given at the foot of the page (1) the seconds of the mean place in both right ascension and declination for the beginning of the year, (2) the secant and the tangent of the mean of the star's greatest and least apparent declinations during the year, and (3) the coefficients of the short-period terms of the nutation, the use of which is explained on page 201.

Pages 514–521 contain, for Washington apparent noon, the *Apparent Right Ascension* and *Declination* of the Sun, the *Equation of Time*, and the *Variation per Hour* of these quantities; the *Semidiameter* of the Sun, and the *Sidereal Time of Semidiameter Passing Meridian*. The last column on each page contains the *Sidereal Time of Mean Noon*.

The *Equation of Time, Mean–App.* is the correction to be applied to apparent time in order to obtain mean time. Each number as given is the mean time of transit of the Sun's center over the meridian of Washington counted from the nearest noon.

Pages 522–537 contain the *Right Ascension of Center*, the *Geocentric Declination of Center*, the *Sidereal Time of Semidiameter Passing Meridian*, the *Geocentric Semidiameter*, and the *Equatorial Horizontal Parallax* of the Moon, and the *Washington Mean Time* at the moment of each upper and lower transit over the meridian of Washington.

The *Variation per Hour of Longitude* is the correction to be applied in each case to the quantity in the preceding column to obtain its value for the time of transit over the meridian one hour west of Washington, supposing the rate of change to be uniform and equal to what it is at the instant of transit over the meridian of Washington. The quantities in the third column, when corrected for another longitude by the hourly variations, give the local mean time of transit for that longitude. By means of the variations per hour of longitude any one of the quantities under consideration can be computed with great exactness for the moment of transit over any meridian not more than one hour

distant from Washington. To obtain the same accuracy for more distant meridians, we may proceed as follows: Let F represent either the *Washington Mean Time*, the *Right Ascension of Center*, or the *Geocentric Declination of Center*, and let V represent the corresponding *Variation per Hour of Longitude*. Write down three successive values of F, together with the corresponding values of V, and difference the latter as in the following scheme, where the middle values, F_0 and V_0, belong to the culmination from which is to be derived the value of F for the culmination on the meridian whose longitude is λ:—

Function.	Var. per Hour of Longitude.	Δ'	Δ''
F_{-1}	V_{-1}		
		a'	
F_0	V_0		b
		a''	
F_{+1}	V_{+1}		

Then, for the culmination at the meridian λ

$$F_\lambda = F_0 + \lambda V_0 + \frac{\lambda^2}{48}(a' + a'') + \frac{\lambda^3 b}{864}$$

where λ must be expressed in hours and decimals of an hour, and reckoned from Washington or from 180° from Washington according as the upper or lower culmination is used for the middle value (F_0). Adding twelve hours to the Washington time of lower transit at Washington gives the local time of upper transit at places whose longitude is 180° from Washington.

The column *Bright Limbs* is given to indicate to the observer which limbs are illuminated. When one limb is full and the terminator is within 1″ of the opposite limb, both can be well observed, and in such cases both are indicated, the defective limb being indicated by an italic letter or numeral, and the correction for defective illumination (as seen from Washington) being given in a footnote.

Pages 538–553 contain for six of the major planets, the geocentric *Apparent Right Ascension* and *Declination*, the *Horizontal Parallax*, *Semidiameter*, *Sidereal Time of Semidiameter Passing Meridian*, and the *Washington Mean Time*, for the moments of all transits which it is usually desirable to observe over the meridian of Washington. The stellar magnitude at opposition for Jupiter, Saturn, Uranus, and Neptune, respectively, is given at the bottom of the page containing the ephemeris of the planet.

PART III.—PHENOMENA.

This part gives the dates of the principal astronomical phenomena of the year, expressed in Greenwich mean time, except in the case of the occultations visible at Washington, where Washington time is used.

Pages 556–563 contain all necessary data respecting the solar and lunar eclipses which occur during the year.

The eclipse elements are given for the moment of conjunction of the Sun and Moon in right ascension, but the subsequent tables and results are computed from the exact positions of these bodies at the several instants referred to. *The times and angles* designated as the circumstances of a lunar eclipse

remain the same throughout all parts of the Earth, and require no explanation beyond a mere statement of the fact that in computing them the geometrical diameter of the Earth's shadow has been augmented in the proportion of 51:50.

The principal circumstances of each total and annular eclipse of the Sun are stated in five lines, as follows:—

The line entitled "Eclipse begins" gives the Greenwich mean time at which the Moon's penumbra first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse begins" gives the time when the axis of the Moon's shadow first touches the Earth, together with the latitude and longitude of the point of contact.

The line entitled "Central eclipse at local apparent noon" gives the time when the axes of the Earth and of the shadow cone lie in the same plane, together with the latitude and longitude of the point where the axis of the shadow cone then cuts the Earth's surface.

The lines entitled "Central eclipse ends" and "Eclipse ends" give, respectively, the times when and the localities where these events occur, the phenomena being the converse of those denoted by the similar phrases for the beginning.

In the case of partial solar eclipses the axis of the Moon's shadow does not come into contact with the Earth, and the three lines entitled, respectively, "Central eclipse begins," "Central eclipse at local apparent noon," and "Central eclipse ends," are replaced by a single line entitled "Greatest eclipse," whereon are given the time when and the latitude and longitude where the eclipse attains its greatest magnitude. The latter phenomenon necessarily occurs with the Sun in the horizon.

Maps of the Eclipses.—The regions in which each eclipse is visible are shown upon the map relating to it, from which may be taken approximately, for any place, both the times of the beginning and ending of the eclipse and its magnitude. The dotted curves show the outline of the shadow for each hour of Greenwich mean time, and therefore pass through all places where the eclipse begins or ends at the hour indicated. To find the instant of beginning at any place, we determine by inspection between what pair of these curved lines the place is situated. The eclipse will then begin between the corresponding hours of Greenwich mean time; and the fraction of the hour may be determined by dividing the hour in the same proportion as the space representing it on the map is divided by the place in question. This division may be made a little more exact by allowing for changes in the spaces as indicated by their varying width. The Greenwich mean time thus found must be reduced to local mean time by applying the longitude.

As an example, suppose we wish to find the times at which the eclipse of November 22, 1919, begins and ends at the place whose latitude is $-10°$ and whose longitude is $+50°$.

For the beginning we compare the distance of the place from the curves of 1^h and 2^h and find it to correspond to about 35 minutes from the former, thus giving for the approximate time of beginning $1^h\ 35^m$; for the end we compare the distance of the place from the curves of 5^h and 6^h and find it to

correspond to about 13 minutes from the former, thus giving for the approximate time of ending, $5^h\ 13^m$; and both of these results are probably correct to within 3 or 4 minutes.

Changing to local mean time, we shall have—

		Beginning. d h m	Ending. d h m
Greenwich mean time	November	22 1 35	22 5 13
Longitude west		3 20	3 20
Local Mean Time	November	21 22 15	22 1 53

In the case of total and annular eclipses, a fair estimate of the magnitude of the eclipse at any place may be obtained from the position thereof relative to the central line and to the limit. On the central line the eclipse is annular or total, while between the central line and the limit the maximum magnitude of the eclipse is given by the quotient of the distance of the place from the limit divided by the distance of the central line from the limit, the measurements being made upon a line drawn through the place perpendicularly to the central line.

More Accurate Computations.—A more accurate determination of the phases, as visible at any point of the Earth's surface, may be obtained from the Besselian elements which are given for every 10 minutes of Greenwich mean time. Their geometric signification is as follows:—

Let us imagine a plane passing through the center of the Earth, perpendicular to the right line joining the centers of the Sun and Moon. This latter line is the axis of the Moon's shadow, and the plane is called the *fundamental plane* or plane of xy. We take the intersection of this plane with that of the Earth's equator as the axis of x, and the center of the Earth as the origin of coordinates. The axis of y is perpendicular to that of x, and directed toward the north; x and y are then the coordinates of the point in which the axis of the shadow intersects the fundamental plane, and they are here expressed in terms of the Earth's equatorial radius as unity. The angle d, of which the sine and cosine are both given, is the declination of that point of the celestial sphere toward which the axis of the shadow is directed; or, in other words, it is the declination of the center of the Sun as seen from the center of the Moon. The angle μ is the Greenwich hour-angle of this same point of the celestial sphere.

The quantities l_1 and l_2 are the radii of the shadow cones upon the fundamental plane, l_1 corresponding to the penumbra, and l_2 to the umbra. The notation is that of CHAUVENET'S *Spherical and Practical Astronomy*, in which l_2 is regarded as positive for an annular and negative for a total eclipse.

The angles f_1 and f_2, the tangents of which are given, are the angles which the elements of the respective shadow cones make with the axis of the shadow; or, they are the semiangles of the two cones.

In order to facilitate interpolation to any required moment, the logarithms of x', y', and μ', which are the changes of x, y, and μ, in one minute of time, are given at the bottom of the table.

The method of computing an eclipse from its Besselian elements is based on the fact that the distance of the observer from the axis of the shadow cones *is equal to the radius of the* penumbra at the point of observation for the beginning and ending of the eclipse, and is equal to the radius of the umbra at

point
phase
(
tions
mean
(
variat
elements.

φ being, as usual, the geographic latitude.

Table for Computing the Geocentric Coordinates of a Place.

φ	Log F.		Log G.	
0°	0.00000		0.00293	
5	0.00001	1	[illegible]	1
10	0.00004	3	0.00289	3
15	0.00010	6	0.00283	6
20	0.00017	7	0.00276	7
25	0.00026	9	0.00267	9
30	0.00037	11	0.00256	11
35	0.00048	11	0.00245	11
40	0.00060	12	0.00232	13
45	0.00073	13	0.00220	12
50	0.00086	13	0.00207	13
55	0.00098	12	0.00195	12
60	0.00110	12	0.00183	12
65	0.00120	10	0.00173	10
70	0.00129	9	0.00164	9
75	0.00137	8	0.00156	8
80	0.00142	5	[illegible]	5
85	0.00145	3	0.00148	3
90	0.00146	1	0.00146	2

For the assumed Greenwich mean time of computation, take from the table of elements the values of sin d, cos d, and μ. Then, with λ for the longitude west from Greenwich, the coordinates of the observer will be—

$$\xi=\rho\cos\varphi'\sin(\mu-\lambda)$$
$$\eta=\rho\sin\varphi'\cos d-\rho\cos\varphi'\sin d\cos(\mu-\lambda)=\eta_1-\eta_2$$
$$\zeta=\rho\sin\varphi'\sin d+\rho\cos\varphi'\cos d\cos(\mu-\lambda)=\zeta_1+\zeta_2$$

and their variations in one minute of mean time will be—

$$\xi'=[7.63992]\,\rho\cos\varphi'\cos(\mu-\lambda)$$
$$\eta'=[7.63992]\,\rho\cos\varphi'\sin d\sin(\mu-\lambda)=[7.63992]\,\xi\sin d$$

ζ' is not needed.

(2) For the same assumed moment of Greenwich mean time, take from the tables of elements the coordinates x and y of the axis of the shadow, together with their variations for one minute, which are equal to one-tenth of the differences of two consecutive numbers. These variations are represented by x' and y', and their logarithms are given beneath the tables of x and y.

(3) The distance m and position-angle M of the axis of the shadow relative to the observer, and the relative motions, n and N, are computed by the formulæ—

$$m\sin M=x-\xi$$
$$m\cos M=y-\eta$$
$$n\sin N=x'-\xi'$$
$$n\cos N=y'-\eta'$$

(4) Both for the umbra and for the penumbra, the radius L at the distance ζ from the fundamental plane is computed by the formulæ—

$$L=l-\zeta\tan f$$

l and f being taken from the table of elements, and ζ computed in (1).

(5) If the time chosen for computation is exactly that of the beginning or ending of the eclipse, we shall have—

$$m=L$$

But, as this condition will rarely be fulfilled on a first trial, a correction τ to the assumed time is computed thus: Find the angle ψ from the equation—

$$\sin\psi=\frac{m\sin(M-N)}{L}$$

There will be two values for this angle; the one for which cos ψ is negative must be taken for the beginning of the eclipse, for the beginning of the annular phase, or for the ending of the total phase, but the one for which cos ψ is positive must be taken for the ending of the eclipse, for the ending of the annular phase, or for the beginning of the total phase. The correction τ to the assumed time will then be found, in minutes, from—

$$\tau=-\frac{m\cos(M-N)}{n}+\frac{L\cos\psi}{n}$$

However, only in case the value of τ does not exceed a few minutes can the time thus corrected be considered even fairly accurate. Therefore it is best to commence the computation by assuming times near the phenomena wanted. The times for the beginning and the ending of an eclipse may be

Computation of the Solar Eclipse of November 22, 1919, for Havana, Cuba.

The position of Havana is—

Latitude, $\varphi = +23°\ 9'\ 21''$
Longitude, $\lambda = +82°\ 21'\ 30''$

and its geocentric coordinates are—

$\rho \sin \varphi' = 9.59194$
$\rho \cos \varphi' = 9.96374$

From the eclipse chart we find the approximate times of the phases to be—

		d	h	m	
Beginning	Nov.	22	0	20	Greenwich Mean Time.
Middle		22	1	50	
Ending		22	3	20	

	Beginning.	Middle.	Ending.
T Nov. 22	$0^h\ 20^m$	$1^h\ 50^m$	$3^h\ 20^m$
μ	8° 29′ 42″	30° 59′ 36″	53° 29′ 30″
λ	82 21 30	82 21 30	82 21 30
$\mu-\lambda$	−73 51 48	−51 21 54	−28 52 0
$\log \rho \cos \varphi'$	9.96374	9.96374	9.96374
$\log \sin (\mu-\lambda)$	9.98254n	9.89273n	9.68374n
$\log \xi$	9.94628n	9.85647n	9.64748n
$\log \cos d$	9.97305	9.97301	9.97297
$\log \rho \sin \varphi'$	9.59194	9.59194	9.59194
$\log \sin d$	9.53359n	9.53387n	9.53415n
$\log \eta_1$	9.56499	9.56495	9.56491
$\log \zeta_1$	9.12553n	9.12581n	9.12609n
$\log \sin d$	9.53359n	9.53387n	9.53415n
$\log \rho \cos \varphi'$	9.96374	9.96374	9.96374
$\log \cos (\mu-\lambda)$	9.44394	9.79544	9.94238
$\log \cos d$	9.97305	9.97301	9.97297
$\log \eta_2$	8.94127n	9.29305n	9.44027n
$\log \zeta_2$	9.38073	9.73219	9.87909
η_1	+0.36727	+0.36724	+0.36721
$-\eta_2$	+0.08735	+0.19636	+0.27559
ζ_1	−0.13352	−0.13360	−0.13369
ζ_2	+0.24029	+0.53975	+0.75698
ζ	+0.10677	+0.40615	+0.62329
$\log \rho \cos \varphi'$	9.96374	9.96374	9.96374
$\log \cos (\mu-\lambda)$	9.44394	9.79544	9.94238
log const.	7.63992	7.63992	7.63992
$\log \xi$	9.94628n	9.85647n	9.64748n
$\log \sin d$	9.53359n	9.53387n	9.53415n
$\log \xi'$	7.04760	7.39910	7.54604
$\log \eta'$	7.11979	7.03026	6.82155
x	−1.39590	−0.64649	+0.10307
ξ	−0.88365	−0.71857	−0.44410
$x-\xi$	−0.51225	+0.07208	+0.54717
y	+0.62330	+0.53430	+0.44578
η	+0.45462	+0.56360	+0.64280
$y-\eta$	+0.16868	−0.02930	−0.19702
x'	+0.008325	+0.008327	+0.008329
ξ'	+0.001116	+0.002507	+0.003516
$x'-\xi'$	+0.007209	+0.005820	+0.004813
y'	−0.000992	−0.000986	−0.000981
η'	+0.001318	+0.001072	+0.000663
$y'-\eta'$	−0.002310	−0.002058	−0.001644

	Beginning.	Middle.	Ending.
$\log m \sin M$	9.70948n	8.85781	9.73813
$\log \sin$ or $\cos M$	9.97765n	9.96679	9.97353
$\log m \cos M$	9.22707	8.46687n	9.29451n
$\log \tan M$	0.48241n	0.39094n	0.44362n
$\log n \sin N$	7.85788	7.76492	7.68242
$\log \sin$ or $\cos N$	9.97878	9.97442	9.97604
$\log n \cos N$	7.36361n	7.31345n	7.21590n
$\log \tan N$	0.49427n	0.45147n	0.46652n
M	288° 13′ 36″	112° 7′ 18″	109° 48′ 8″
N	107 46 1	109 28 27	108 51 31
$M-N$	180 27 35	2 38 51	0 56 37
$\log m$	9.73183	8.89102	9.76460
$\log n$	7.87910	7.79050	7.70638
$\log \zeta$	9.02845	9.60869	9.79469
$\log \tan f$	7.67540	7.67324	7.67541
$\log \zeta \tan f$	6.70385	7.28193	7.47010
l	+0.57397	+0.02799	+0.57409
$\zeta \tan f$	+0.00051	+0.00191	+0.00295
L	+0.57346	+0.02608	+0.57114
$\log m$	9.73183	8.89102	9.76460
$\log \sin (M-N)$	7.90437n	8.66456	8.21665
colog L	0.24150	1.58369	0.24326
$\log \sin \psi$	7.87770n	9.13927	8.22451
ψ	180° 25′ 56″	{172° 4′ 45″ / 7 55 15}	0° 57′ 39″
$\log m/n$	1.85273	1.10052	2.05822
$\log \cos (M-N)$	9.99999n	9.99954	9.99994
log (1)	1.85272n	1.10006	2.05816
$\log L$	9.75850	8.41631	9.75674
$\log \cos \psi$	9.99999n	(∓)9.99584	9.99994
colog n	2.12090	2.20950	2.29362
log (2)	1.87939n	(∓)0.62165	2.05030
−(1)	+71.240	−12.591	−114.329
+(2)	−75.752	∓ 4.185	+112.279
τ	$-4^m.512$	{$-16^m.776$ / -8.406}	$-2^m.050$
T	$22^d\ 0^h\ 20^m$	$22^d\ 1^h\ 50^m$	$22^d\ 3^h\ 20^m$
$T+\tau$	$22^d\ 0^h\ 15^m.488$	{$22^d\ 1^h\ 33^m.224$ / 22 1 41.594}	$22^d\ 3^h\ 17^m.9$[illegible]

Taking the four times just found, we make a new computation in each case. The times resulting from the new computation are—

	Greenwich Mean Time. d h m s	Local Mean Time. d h m s
Beginning of the eclipse .	November 22 0 15 30.2	21 18 46 4.2
Beginning of annular eclipse	1 33 30.8	20 4 4.8
Ending of annular eclipse	1 41 41.5	20 12 15.5
Ending of the eclipse	3 17 57.4	21 48 31.4

The values from the last approximation of the quantities needed in computing the position angles, and the computation of these position angles, are—

	1st Contact.	2d Contact.	3d Contact.	4th Contact.
log ξ	9.94866n	9.88004n	9.86874n	9.65446n
log η	9.65193	9.73647	9.74385	9.80715
log tan C	0.29673n	0.14357n	0.12489n	9.84731n
	°	°	°	°
N	107.64	109.28	109.39	108.91
ψ	180.55	171.98	8.03	0.91
P	288.19	281.26	117.42	109.82
C	296.79	305.70	306.87	324.87
V	351.4	335.6	170.6	145.0

The quantities needed in computing the magnitude of the greatest eclipse, and the computation of that magnitude, are—

	2d Contact.	3d Contact.
log ζ	9.55064	9.58093
log Δ − log m sin $(M-N)$	7.56490	7.56347

T	1^h 38^m	l	+0.5740	$L-\Delta$	+0.5686
log ζ	9.5658	ζ tan f	+0.0017	$2L-0.5446$	+0.6000
log tan f	7.6754	L	+0.5723	D	0.948
log ζ tan f	7.2412	Δ	+0.0037	$1/400\ D$	0.002
				Magnitude	0.95

Pages 564–567 contain the adopted mean places and annual proper motions of such stars, as bright as magnitude 6.5, as will be occulted during the year by the Moon.

Pages 568–605 contain the elements for the prediction of the times of occultations of stars and planets by the Moon during the current year. The system of coordinates employed is similar to that already described for eclipses, the fundamental plane passing through the center of the Earth, and being taken perpendicular to the line joining the star and the center of the Moon, but the cone circumscribing the Moon and star is regarded as a cylinder which intercepts the fundamental plane in a circle having the same linear diameter as the Moon.

In the columns referring to the star, those headed *Red'ns from 1919.0* give the quantities necessary to reduce the mean place of the star at the beginning of 1919 to its apparent place at the time of occultation. These reductions are sufficiently accurate to be definitive.

Under the general head, *At Conjunction in R. A.*, are five columns giving certain quantities for the moment of geocentric conjunction of the Moon and star in right ascension, as follows:

The Greenwich Mean Time is the moment, T, at which the two bodies are *in geocentric* conjunction in right ascension. At that moment the coordinate

of the axis of the cylinder on the fundamental plane has the value zero. ıe column *Hour Angle*, H, gives the common geocentric hour-angle of the oon and star at the same moment, expressed in sidereal time and counted om the meridian of Greenwich—positive toward the west and negative ward the east. Column Y gives the coordinate y of the axis of the cylinder on the fundamental plane at the same moment. Columns x' and y' give e variations of x and y in one hour of mean time. The linear unit in these lumns is the Earth's equatorial radius. The limiting parallels, north and uth, show the extreme limits of latitude within which the occultation will be sible.

By the aid of these elements, the time of immersion and emersion of a ar relative to the limb of the Moon may be computed for any part of the arth by a method nearly the same as that already explained for computing lipses, but somewhat more simple.

Prediction of Occultations for a given Place.—When it is desired to predict e circumstances of one or more occultations at any place, the first step will to select them from the general list given in the Ephemeris. The conditions visibility are:—

1. The limiting parallels in the last columns must include the latitude of e place.

2. The quantity $H-\lambda$, taken without regard to sign, must be less than e semidiurnal arc of the star by at least one hour. On very rare occasions emersion might be seen in the east, or an immersion in the west, when this fference is a few minutes less than an hour.

3. The Sun must not be much more than an hour above the horizon at the cal mean time $T-\lambda$, unless the star is bright enough to be seen in the daytime.

When many occultations are to be selected, the most convenient course ll be to write the value of $-\lambda$ on the bottom of a slip of paper, and in passing rough the list of occultations to pause over each one for which condition (1) fulfilled, and examine by means of the slip whether conditions (2) and (3) e also fulfilled. If either fails, the computer passes on. Sometimes it will difficult to determine whether $H-\lambda$ or $T-\lambda$ falls within the limits; and in ch cases the computer may mark the occultation for trial and leave the cision for the subsequent operations. The whole list can be gone over in s than a day, and it will probably be found that about one-tenth of the cultations are marked for trial.

The next step will be to compute the local times of immersion and emer-on from the elements, and to that end let—

T = the instant of geocentric conjunction of Moon and star in right ascension, expressed in Greenwich mean time;
H = the Greenwich west hour-angle of the two bodies at that moment;
λ = the longitude west of Greenwich;
$h_0 = H-\lambda$ = the local hour-angle of the star at the instant T;
δ = the star's declination.

The procedure for each occultation will then be as follows:—

(1) The geocentric coordinates of the place, $\rho \sin \varphi'$ and $\rho \cos \varphi'$, are be computed by the formulæ and table given in connection with eclipses page 752.

The next step will be to find the approximate instant of apparent conjunction of the Moon and star as seen from the place, and that may be deduced from the time of geocentric conjunction by the application of an approximate correction taken from DOWNES's table, printed in the volumes of the American Ephemeris for 1882 to 1899. This correction must be reckoned in mean solar hours, and will be designated by the symbol t. It will have the same sign as h_0.

When DOWNES's table is not available, the correction may be computed from the formulæ—

$$\xi_0 = \rho \cos \varphi' \sin h_0$$
$$\xi' = [9.4192]\, \rho \cos \varphi' \cos \tfrac{4}{3} h_0$$
$$t = \frac{\xi_0}{x' - \xi'}$$

By applying t to the Greenwich mean time of geocentric conjunction, as given with the elements, we shall have the Greenwich mean time of local conjunction within a few minutes.

(2) Compute for the instant $T+t$ the following quantities, in which t_0 is the sidereal equivalent of the mean time interval t:

$$\xi = \rho \cos \varphi' \sin (h_0+t_0)$$
$$\eta = \rho \sin \varphi' \cos \delta - \rho \cos \varphi' \sin \delta \cos (h_0+t_0) = \eta_1 - \eta_2$$
$$\xi' = [9.4192]\, \rho \cos \varphi' \cos (h_0+t_0)$$
$$\eta' = [9.4192]\, \rho \cos \varphi' \sin \delta \sin (h_0+t_0) = [9.4192]\, \xi \sin \delta$$
$$x = x't$$
$$y = Y + y't$$

Compute also m, M, n, N, and ψ from the equations—

$$m \sin M = x - \xi$$
$$m \cos M = y - \eta$$
$$n \sin N = x' - \xi'$$
$$n \cos N = y' - \eta'$$
$$\sin \psi = [0.5646]\, m \sin (M-N)$$

ψ being taken between the limits $\pm 90°$. Finally compute,

$$\tau = -\frac{[1.7782]m}{n} \cos (M-N) \mp \frac{[1.2135]}{n} \cos \psi$$
$$\delta\tau = \frac{[6.7591]\tau^2}{n \cos \psi} [\eta_2 \cos (N \mp \psi) - \xi \sin (N \mp \psi)]$$

where the double signs are to be taken negative for an immersion and positive for an emersion. Both τ and $\delta\tau$ thus have two values, which are expressed in minutes of time, and in order to distinguish them let those pertaining to immersion be designated, respectively, τ' and $\delta\tau'$, while those pertaining to emersion are designated τ'' and $\delta\tau''$. We then have for the Greenwich mean times of the phases,

Instant of immersion $= T+t+\tau' + \delta\tau'$
Instant of emersion $= T+t+\tau'' + \delta\tau''$

These expressions are practically exact, as the corrections $\delta\tau$ seldom amount to so much as 1.5 minutes, and whenever an inaccuracy of that magnitude is permissible they may be omitted. As a check upon the results it will be advisable to compute ξ, η, x, and y for the times of immersion and emersion finally obtained. If these times are correct, the quantities in question will fulfill the condition,

$$\sqrt{(x-\xi)^2 + (y-\eta)^2} = 0.2725$$

If $\log m \sin (M-N) > 9.4354$, $\sin \psi$ will be numerically greater than unity, and no occultation is to be expected at the given place; but a very brief one may occur if the excess of the computed distance over the Moon's semidiameter happens to be within the errors of the ephemerides of the Moon and star.

The position-angle of the line from the Moon's center to the star, at the time of contact, is reckoned from the north point toward the east, and designated by the symbol P. It is computed from the formulæ—

$$P = N - \psi + \delta P \qquad \text{for immersion,}$$
$$\text{or} \qquad P = N + \psi + \delta P \pm 180° \quad \text{for emersion,}$$

where the angles $N-\psi$ and $N+\psi$ are taken directly from the computation of τ, and δP is found in degrees of arc from the expression,

$$\delta P = \mp \frac{[7.3038]\tau^2}{\cos \psi}[\eta_2 \sin N + \xi \cos N]$$

In the latter formula the double sign is to be taken negative for an immersion and positive for an emersion.

The angle from the vertex, V, is also reckoned in the direction from the north toward the east, and is found from the formula

$$V = P - C$$

where C is computed from the expression,

$$\tan C = \frac{\xi + [8.2218]\tau\xi' - [4.9810]\tau^2\xi}{\eta + [8.2218]\tau\eta' + [4.9810]\tau^2\eta_2}$$

C being taken less or greater than 180°, according as the numerator is positive or negative.

The value of τ employed in the latter formula must be so taken as to correspond with the phase for which C is required.

In the volumes of the American Ephemeris for the years 1882 to 1901 instructions are given for constructing three special tables which greatly diminish the labor of computing occultations, but as these tables should contain from 4700 to 6300 quantities, and as they would apply only to the place for which they were computed, it will rarely be worth while to undertake the labor of forming them. Those who desire further information on the subject may consult any one of the volumes in question.

As an example of an isolated occultation, we will compute that of α Cancri on March 12, 1919, for Des Moines, Iowa, whose position is—

$$\varphi = +41° \ 36' \ 0''$$
$$\lambda = + \ 6^h \ 14^m \ 31^s$$

and whose geocentric coordinates are—

$$\rho \sin \varphi' = 9.8198$$
$$\rho \cos \varphi' = 9.8744$$

From the elements on page 575 we have,

$$T = 18^h \ 13^m.4$$
$$H = + \ 8 \ 38.6$$

and

$$h_0 = H - \lambda = + \ 2 \ 24.1$$

From the formulæ on page 758, we find the correction, t, to the Greenwich mean time of geocentric conjunction, T, to be about $+1^h\ 4^m.4$; therefore the Greenwich mean time of apparent conjunction is—

$$T+t = \text{March } 12^d\ 19^h\ 17^m.8$$

α Cancri.	Apparent Declination.	G. M. T. of ☌	Hour Angle.	Y	x'	y'
	° ′	d h m	h m			
	+12 10.1	Mar. 12 18 13.4	+8 38.6	+0.5842	0.5420	−0.1768

	h m
h_0	+2 24.1
t_0	+1 4.6
h_0+t_0	+3 28.7
log (ρ cos φ')	9.8744
log sin (h_0+t_0)	9.8976
log ξ	9.7720
log (ρ sin φ')	9.8198
log cos δ	9.9901
log η_1	9.8099
log (ρ cos φ')	9.8744
log sin δ	9.3238
log cos (h_0+t_0)	9.7876
log η_2	8.9858
η_1	+0.6455
$-\eta_2$	−0.0968
log (ρ cos φ')	9.8744
log cos (h_0+t_0)	9.7876
log const.	9.4192
log ξ	9.7720
log sin δ	9.3238
log ξ'	9.0812
log η'	8.5150
log x'	9.7340
log t	0.0306
log y'	9.2475 n
log x	9.7646
log $y't$	9.2781 n

$y't$	−0.1897
Y	+0.5842
x	+0.5816
ξ	+0.5916
$x-\xi$	−0.0100
y	+0.3945
η	+0.5487
$y-\eta$	−0.1542
x'	+0.5420
ξ'	+0.1206
$x'-\xi'$	+0.4214
y'	−0.1768
η'	+0.0327
$y'-\eta'$	−0.2095
log m sin M	8.0000 n
log cos M	9.9991 n
log m cos M	9.1881 n
log tan M	8.8119
log n sin N	9.6247
log sin N	9.9520
log n cos N	9.3212 n
log tan N	0.3035 n
	° ′
M	183 43
N	116 26
$M-N$	67 17

log m	9.1890
log n	9.6727
log const.	0.5646
log m	9.1890
log sin ($M-N$)	9.9649
log sin ψ	9.7185
ψ	+31° 32′
log const.	1.7782
log m/n	9.5163
log cos ($M-N$)	9.5868
log (1)	0.8813
log const.	1.2135
colog n	0.3273
log cos ψ	9.9306
log (2)	1.4714
	m
−(1)	− 7.61
∓(2)	∓29.61
τ for immersion	−37.22
τ for emersion	+22.00

The computation of $\delta\tau$ for the two contacts is as follows:

	Immersion.	Emersion.
$N\mp\psi$	84° 54′	147° 58′
log cos ($N\mp\psi$)	8.9489	9.9283 n
log η_2	8.9858	8.9858
log (1)	7.9347	8.9141 n
log sin ($N\mp\psi$)	9.9983	9.7246
log ξ	9.7720	9.7720
log (2)	9.7703	9.4966
(1)	+0.0086	−0.0821
(2)	+0.5892	+0.3138
(1)−(2)	−0.5806	−0.3959

	Immersion.	Emersion.
log [(1)−(2)]	9.7639 n	9.5976
log const.	6.7591	6.7591
log τ^2	3.1414	2.6848
colog (n cos ψ)	0.3967	0.3967
log $\delta\tau$	0.0611 n	9.4382
	d h m	h m
$T+t$	Mar. 12 19 17.8	19 17.8
τ	−37.22	+22.0
$\delta\tau$	− 1.15	− 0.2
Greenwich M. T.,	Mar. 12 18 39.4	19 39.5
λ	+ 6 14.5	+6 14.5
Des Moines M. T.,	Mar. 12 12 24.9	13 25.0

To find δP and P:

$\log \eta_2$	8.9858	$\log \xi$	9.7720	(3)	+0.0867
$\log \sin N$	9.9520	$\log \cos N$	9.6485n	(4)	−0.2633
$\log$ (3)	8.9378	$\log$ (4)	9.4205n	(3)+(4)	−0.1766

	Immersion.	Emersion.		Immersion. °	Emersion. °
$\log [(3)+(4)]$	9.2470n	9.2470n	δP	+ 0.6	− 0.2
log const.	7.3038n	7.3038	N	116.4	116.4
$\log r^2$	3.1414	2.6848	$\mp\psi$	−31.5	+31.5
colog $\cos \psi$	0.0694	0.0694	const.	0.0	180.0
$\log \delta P$	9.7616	9.3050n	P	85.5	327.7

Pages 606–607 contain in detail all the data necessary for observing every occultation of the general list which is visible at Washington during the current year.

Page 608 contains the *Ephemeris for Physical Observations of the Sun.*

Page 609 contains certain elements referring to the Moon, its equator, and its orbit.

i – the inclination of the Moon's mean equator to the Earth's true equator.

Δ – the distance on the Moon's mean equator from its ascending node on the Earth's true equator to its ascending node on the ecliptic of date.

☊′ – the distance along the Earth's true equator from the true equinox to the ascending node of the Moon's mean equator.

Γ' – the longitude of the perigee of the Moon's orbit, referred to the mean equinox of date.

☊ – the longitude of the ascending node of the Moon's orbit on the ecliptic, referred to the mean equinox of date.

☾ – the Moon's mean longitude, referred to the mean equinox of date.

Pages 610–617 contain the *Ephemeris for Physical Observations of the Moon.* The selenographic longitudes are measured in the plane of the Moon's equator, the axis of reference being the radius of the Moon which passes through the mean center of the visible disk positive toward the west—i. e., toward Mare Crisium—and the latitudes are measured from the Moon's equator, positive toward the north—i. e., in the hemisphere containing Mare Serenitatis.

The optical and physical librations in longitude and latitude have been computed with elements and formulæ given on page xi, and their sums are given in the second and third columns, respectively, the physical libration being given separately in the fourth and fifth columns. The Sun's selenographic colongitude (90° − longitude) and latitude and the position-angle of the Moon's axis, C, in the sixth, seventh, and eighth columns, respectively, have all been corrected for the effect of physical libration.

When the libration in longitude is positive, the mean center of the disk is displaced toward the east—that is, the region thus exposed to view is on the west limb—and when the libration in latitude is positive the mean center of the disk is displaced toward the south—that is, the region thus exposed to view is on the north limb.

The altitude of the Sun, A, at any given time above the horizon of any point on the Moon whose selenographic longitude and latitude, λ and β, are known, may be computed from the following formula, the Sun's selenographic longitude and latitude being denoted by $l_\odot$ and $b_\odot$, respectively:

$$\sin A = \sin b_\odot \sin \beta + \cos b_\odot \cos \beta \cos (l_\odot - \lambda)$$

Pages 618–619 contain the data with reference to the illuminated disks of Mercury and Venus. The angle θ is the angle which the arc of the great circle from the planet to the Sun makes with the arc from the planet toward the west, measured in the direction west, north, east, south. It is measured from 0° to 360°. We may also regard θ as expressing the angle which the line of cusps makes with the meridian, the positive direction of the meridian being toward the north, and the positive direction of the line of cusps that in which a person following this line would have the illuminated portion of the disk on his right.

Pages 620–621 contain the *Ephemeris for Physical Observations of Mars.* The quantities here given have been corrected for aberration, so that in using them they should be interpolated to the actual time of observation.

P—the position-angle of the axis of rotation measured eastward from the north point of the disk.

$A\oplus$, $A\odot$—the planetocentric right ascensions of the Earth and Sun, respectively, measured in the plane of the planet's equator from its vernal equinox.

$D\oplus$, $D\odot$—the planetocentric declinations of the Earth and Sun, respectively, referred to the planet's equator.

$\odot ♂$—the planetocentric longitude of the Sun measured in the plane of the planet's orbit from its vernal equinox.

k—the ratio of the area of the illuminated portion of the apparent disk to the area of the entire apparent disk regarded as circular.

i—the angle between the Sun and the Earh as seen from the planet.

q—the angular value of the greatest defect of illumination as seen from the Earth.

Q—the position-angle of the radius of the disk which passes through the point of greatest defect of illumination—that is, of the radius perpendicular to the line joining the cusps. It is measured eastward from the north point of the disk.

The column headed *Central Meridian* contains the longitude of the meridian which bisects the disk, measured from the adopted zero meridian.

The columns headed *Mean Time of Transit of Zero Meridian* contain the Greenwich Mean Time of every transit of the zero meridian across the actual center of the disk.

Pages 622–625 contain the *Ephemeris for Physical Observations of Jupiter.*

The columns headed *Central Meridian* contain the longitudes of the meridian which bisects the disk, measured from the adopted zero meridian of System I and System II, respectively.

The column headed *Correction for Phase* contains the corrections to be applied to the longitudes of the central meridian to obtain the longitudes of the meridian bisecting the illuminated disk.

The column headed *Transit of Zero Meridian* contains the Greenwich Mean Time of every fifth transit of the zero meridian across the center of the illuminated disk.

The quantities in the remaining columns on pages 622–625 are the same as those defined under the *Ephemeris for Physical Observations of Mars.*

Pages 626–651 contain, concerning the *Satellites of Jupiter,* the diagram of the orbits of Satellites I–V, the times of conjunction of Satellites I–IV, the times of elongation of Satellite V, the differences in right ascension and declination between Jupiter and Satellites VI and VII, and the phenomena *of the Satellites* I–IV together with their configurations.

Page 652 contains the *Magnitude of Saturn* and the *Elements of the Rings.*

a, b—the major axis and minor axis, respectively, of the outer ellipse of the outer ring.

P—the position-angle of the northern semi-minor axis of the rings, measured from the north, positive toward the east.

B—the Saturnicentric latitude of the Earth referred to the plane of the rings, positive toward the north.

$U+180°$—the Saturnicentric longitude of the Earth measured in the plane of the rings from their ascending node on the Earth's equator.

ω—the distance in the plane of the rings from their ascending node on the Earth's equator to their ascending node on the ecliptic.

B'—the Saturnicentric latitude of the Sun referred to the plane of the rings, positive toward the north.

$U'+180°$—the Saturnicentric longitude of the Sun measured in the plane of the rings from their ascending node on the ecliptic.

Pages 653–661 contain, concerning the *Satellites of Saturn,* the diagram of the orbits of the seven inner satellites, the times of elongation for the first eight satellites, the differences in right ascension and declination between Saturn and Phœbe, the ninth satellite, and tables for predicting the position-angles and distances from the center of the planet of the first eight satellites.

Page 662 contains the diagram of the orbits of the satellites of Uranus, together with the times of their elongations.

Pages 663–664 contain tables for predicting the position-angles and distances from the center of the planet of the satellites of Uranus and Neptune.

Page 665 contains the diagram of the orbit of the satellite of Neptune, together with the times of its elongations.

Pages 666–667 contain the *Phenomena,* or the configurations of the Sun, Moon, and planets, expressed in the symbols of page xviii. The predicted times of the conjunctions, quadratures, and oppositions of the planets with respect to the Sun are, respectively, the instants when the longitude of each planet differs from that of the Sun by 0°, ±90°, or 180°. For the conjunction of the planets with the Moon and with each other, the predicted times are the instants when the two bodies have the same right ascension. In the case of conjunction the degrees and minutes to the right indicate the difference of declination. Thus, ☌ ♂ ☾ . . . . ♂ $-4° 22'$ would be read "Conjunction of Mars with the Moon, Mars, 4° 22′ to the South."

These pages contain also the beginning of the seasons; the perihelia and aphelia of the planets, including the Earth; the passage of the planets through the nodes of their orbits upon the ecliptic; and the date of lunar and solar eclipses, with their aspect as seen from Washington.

Pages 668–677 contain the *Positions of Observatories,* together with a list of the authorities from which the positions are obtained. The tabular arrangement is self-explanatory.

Page 678 contains two examples in the computation of lunar distances, which are inserted because lunar distance tables are no longer published.

Pages 679–738 contain a series of tables numbered from I to X.

Table I—*For Finding the Latitude by an Observed Altitude of Polaris.*

Table II—For converting *Sidereal into Mean Solar Time.*

Table *III—For* converting *Mean Solar* into Sidereal Time.

Table IV—For finding the *Azimuth of Polaris at All Hour Angles.*

Table V—For finding the *Azimuth of Polaris at Elongation.*

Table VI—*For Finding the Times of Upper and Lower Culmination of Polaris.*

Table VII—For finding the *Apparent Place, Time of Upper Culmination, and Time Interval between Upper Culmination and Elongation,* of Polaris.

Table VIII—For finding the time of *Sunrise* and *Sunset* at any place between the equator and 60° north latitude.

Table IX—*Sunrise and Sunset for Southern Latitudes.*

Table X—For finding the time of *Moonrise* and *Moonset.*

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